THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

An easier feeling appears in the pig iron market. Purchases of 35,000 tons of Bessemer iron for April delivery by the Steel Corporation were made at $15.50 Valley furnaces for the bulk of it and $15.40 at furnace for the balance, the Bessemer association yielding from the stand taken one week ago for $16 at furnace. These transactions show the purpose of the largest interest to hold prices in check and prevent a repetition of the unhealthy boom features of 1902. They thus furnish a key to the policy expected to prevail in finished material markets, though it is to be said that steel billets are today slightly out of proportion with $15.50 pig iron. Foundry pig iron, like steel-making iron, fails to make the advances which have been attempted by some producers for several weeks. Southern iron can be had at $13.50 as heretofore and it is noteworthy that on this basis sales are now made for delivery through the year by furnaces that only recently were unwilling to do this. Northern iron, both in Eastern and Central Western markets, can be had more freely at the prices recently quoted by the lowest sellers and declined by others. Of a 3,000-ton purchase of No. 2 foundry iron in the Pittsburg district, one considerable lot was at $15.75 furnace. Since the buying by three open-hearth steel interests in the East ten days ago, basic iron has been quiet, but foundry irons have been fairly well taken in that section, prices indicating no immediate prospect of an advance. The general run of foundry buyers have iron bought three months ahead and are disposed to await developments as to the second half. As indicating the attitude of large buyers, a 4,000-ton contract is reported from Chicago, one of 2,700 tons from New York and one of 3,000 tons from Pittsburg. The city of Chicago has bought 8,400 tons of cast iron pipe, and that industry is enjoying unusual prosperity.

Meanwhile pig iron production is increasing. Over against it is the improved condition of the foundry trade, but the latter still has much room for expansion. If the great tide of railroad buying and the wants of new industrial enterprises and extensions of old ones prove the needed stimulus to foundry operations, furnacemen have large expectations of the pig iron market in the next few weeks. As yet the runaway condition, for some time assumed to be just ahead, is not more than a contingency.

Selling firms which imported iron freely in 1902 are figuring again on business in foreign iron and steel. Ocean freight and prices abroad are too high for the bringing in of iron for purely home consumption, but a $2 advance would start imports by seaboard consumers.

The building outlook is steadily improving and plans involving large business for the structural mills are coming forward each week. The American Bridge Co. booked 50,000 tons in March, though 40,000 tons is a normal average. Pittsburg, Chicago and New York have made good additions to structural bookings in the past week.

In other lines there has been no marked activity, but with few exceptions finishing mills are getting heavy specifications. Meetings of the billet and plate associations in New York this week decided to make no change in prices. Bar iron lags, among mill products, and the scrap market at the present level works consumption toward steel at the expense of iron. Leading plate mills are three months behind on delivery, but Bessemer tank steel can be shipped in 30 days. Advances of $1 to $2 a ton have been made in light rails, for which recent demand has been unusual. The early spring has stimulated the wire trade to a marked degree, and jobbers' stocks are drawn upon heavily.

A feature of current news from steel works and rolling mills is the unusual number of reports of record production—a factor that is to be considered along with the large additional capacity made available since 1902.

The low freight rates on export steel have been extended by the railroads to the end of the year, and it may be assumed that the leading interest is permanently committed to the sale of a portion of its output in the markets of the world.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, }
429 PARK BUILDING, April 5. }

The United States Steel Corporation this week purchased 35,000 tons of Bessemer iron for delivery in April, practically cleaning up all the unsold April Bessemer at the merchant furnaces. The Bessemer Furnace Association will ship 25,000 tons at $15.50, Valley; a Northern Ohio furnace, through Rogers, Brown & Co., 8,000 tons at $15.40, furnace, and an independent merchant furnace interest in the Valleys will deliver 2,000 tons at $15.40. That the iron was secured at these prices is not surprising, despite the announcement of furnace operators that they would not sell below $16. Practically all sales of Bessemer and basic that have been made in the past two weeks have been on the basis of $15.50, and one lot of 4,500 tons of Bessemer for May, June and July delivery was sold at $15.40. Ten days ago the pig iron committee of the Corporation was undecided whether to continue the buying of Bessemer from month to month, or to close for the entire second quarter. When the latter plan was discussed it was announced that the requirements for the three months would be about 75,000 tons, but it was later decided to continue buying from month to month, owing to the difficulty of fixing requirements so far ahead. Shaded prices continue to be made on foundry iron, despite the efforts of the furnacemen to maintain a minimum of $16 for No. 2. A large local foun-

dry interest purchased 3,000 tons for second and third quarter delivery, and on 1,800 tons secured a price of $15.75, while on the remaining 1,200 tons $16 to $16.15 was paid. The largest producer and dealer in Bessemer and basic in this district, independent of the Bessemer Furnace Association, is completely sold up through April, and during May and June, by the acquisition of another furnace, will be in position to offer some iron. The tonnage on the books of all the merchant furnaces of both Bessemer and basic is heavy, and it has been thought that higher prices are warranted by the conditions, but the Corporation officials are opposed to buying above $15.50 and there is little doubt that the May and June iron will also be sold at this price.

The continuation of the cut rates on steel for export by the railroads to the end of the calendar year, from April 30, indicates that this rate will be made permanent later on. This will enable the mills in this district to hold the foreign trade secured during the depression, although the policy heretofore has been largely to drop the foreign business when the domestic demand increased.

In finished lines, with the exception of merchant pipe, little new business is being placed, although specifications continue heavy. In the wire trade the shipments are largely on contracts made months ago but have been accentuated by the milder weather and the heavy movement from jobbers' warehouses. On open-hearth plates, practically all of the local mills are three months behind on deliveries, although on Bessemer tank plate deliveries can be promised in thirty days. All of the mills are in position to make fairly prompt deliveries of the heavier sections of structural steel, while on the lighter shapes, due to the heavy requirements of steel car works, most of the mills are three months behind. Shipments of sheets and tin plate from all mills are passing all previous records, but in tin plate new business is light, and considerable plate is offered for resale, many consumers having overbought. Black sheets are being shaded $1 a ton by some of the independent mills, this being absolutely necessary to meet the prices made by a few consuming interests on overbought stocks.

Pig Iron.—The purchase of Bessemer iron by the United States Steel Corporation for April delivery at $15.40 to $15.50, despite the decision of the furnace operators that they would hold for $16, indicates that they are endeavoring to hold down the market and have decided that $15.50 is the maximum at which outside iron will be purchased. This is in keeping with the determination of the Corporation to keep the marked on all iron and steel products within reasonable bounds, and the May and June requirements will likely be secured on the same basis. W. P. Snyder & Co., the largest independent producers of steel-making iron, are practically sold up to July 1 on their present furnaces, but will have a small tonnage after May, when the Mabel furnace of M. A. Hanna & Co., purchased some time ago, is turned over. Northern No. 2 for early delivery, in small lots, is quoted at $16 to $16.25, furnace, but for extended deliveries as low as $15.75 can be done. There is little demand for foundry iron, most of the large interests having covered some time ago, and the small foundries that were buying regularly some time ago have not figured as heavy buyers in the past two weeks. We revise quotations as follows:

Bessemer, Valley	$15 40 to 15 50
Bessemer, Pittsburg	16 25 to 16 35
No. 1 Foundry	17 50 to 17 75
No. 2 Foundry	16 85 to 17 35
Gray Forge, Pittsburg	15 85 to 16 00
Basic, Valley	15 35 to 15 50
Basic, Pittsburg	16 10 to 16 35

Steel.—Demand for billets and sheet bars for prompt delivery is heavy, but few of the mills can make deliveries in less than from two to three months. Premiums have also increased, and we note the sale of 1,000 tons of small sheet bars for delivery in May and June at $27, f. o. b. mill, Pittsburg. Billets are quoted at $25 to $25.50, and Bessemer and open-hearth rods, $34 to $34.50.

Ferro-Manganese.—There have been numerous sales of foreign manganese in small lots during the week, and prices have advanced to $49.50 and $50 a ton, delivered Pittsburg in carload lots.

Muck Bar.—The market continues quiet and neutral bars continue to be quoted normally at $28.35 to $28.50, Pittsburg.

Skelp.—Little new business has been placed during the week, but all the mills continue to operate in full on contracts closed earlier in the year. Grooved steel is quoted at 1.50c to 1.55c, and sheared at 1.60c to 1.65c. Grooved iron, 1.65c to 1.70c and sheared, 1.75c to 1.85c.

Rails and Track Material.—Demand for light rails is very heavy, and several of the mills are unable to make deliveries in less than thirty days One large interest is quoting 16 pounds and heavier at $28, 12-pound sections $29 and 8-pound sections at $31. No business has been accepted at these prices, however, as the rerolling mills are quoting about $1 a ton less. Owing to the heavy business still higher prices are expected, few of the consumers having covered earlier in the year when much lower prices prevailed. The rail mill at the Edgar Thomson steel works is running at about 80 percent of its capacity on standard sections, the output having been increased during the week. We revise quotations as follows: Fifty lb. and over 500 tons, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 lb., $27 to $28; 20 lbs., $26 to $26.50; 25 to 45 lb., $25 to $25.50; angle bars for standard sections, 1.25c; spikes, 1.75c to 1.80c.

Plates.—Requirements of steel car works continue heavy, and none of the local mills can promise deliveries on open-hearth stock in less than three months. On Bessemer tank deliveries can be made in 30 days. Quotations are unchanged, as follows: Tank plates, 1¼ in. thick, 6¼ in. to 14 in., inclusive, 1.50c f. o. b. mill Pittsburg; over 14 in. up to 100 in., 1.60c Extras are as follows per lb.: Flange and boiler steel, 10c; marine, A. B. M. A., and ordinary fire box, 20c; still bottom, 30c; locomotive firebox, 50c; plates over 100 in up to 110 in. in width, not less than 5c per 100 lb. extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, $2 extra; gauges 7 and 8, $3 extra; No. 9, $5 extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all pointed of delivery in the United States except Pacific Coast.

Bars.—Demand for bar iron is by no means heavy, and all the local mills are quoting on the basis of 1.65c f. o. b. mill Pittsburg, while the leading producer will not sell below 1.70c Pittsburg. New business in steel bars is light, but specifications are unusually heavy. We quote as follows: Bar iron, 1.65c to 1.69¾c Pittsburg; hoops, 1.65c, and bands, 1.50c, both taking bar extras. Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees, under 3 in., 1.65c. The following differentials are maintained on steel: Less than 2,000 lb of a size and not less than 1,000 lb., 10 cents advance; less than 1,000 lb. of a size, 30 cents advance.

Sheets.—The production of sheets by the mills of the American Sheet & Tin Plate Co. in the month of March broke all records, being approximately 50,000 tons. New business offered in black sheets is considerable, but a very small tonnage is being placed at the advanced price, some of the independent mills making concessions of $1 a ton which they say is necessary to meet the competition of the re-sale sheets offered. We quote black sheets, carloads, as follows: No. 30, 2.80c; No. 29, 2.70c; No. 28, 2.40c; No. 27, 2.30c; Nos. 25-26, 2.25c; Nos. 23-24, 2.20c; Nos. 18-20, 2.15c; No. 16, 2.10c; Nos. 12-14, 2.05c; No. 9, 2c; No. 8, 1.95c. Galvanized, No. 30, 4.35c; No. 29, 3.85c; No. 28, 3.45c; No. 27, 3.25c; Nos. 25-26, 3.05c; Nos. 23-24, 2.85c; Nos. 18-20, 2.70c; No. 16, 2.55c.

Tin Plate.—During the month of March the production of tin plate of the American Sheet & Tin Plate Co. was approximately 50,000 tons. This makes a new record and is much above normal requirements. Considerable re-sale plate is offered by consumers that overbought. Demand for terne plates has improved materially in the past ten days. We quote 100-lb. coke plates at $3.50 net, f. o. b. Pittsburg, terms 30 days, or 2 percent off for cash in ten days.

Pipes and Tubes.—Demand for merchant pipe continues heavy, jobbers asking immediate delivery on material for forward shipment. Boiler tubing continues in big demand and shipments are already considerably behind. Discounts to consumers, carload lots, f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch	67½	51½	65½	49½
¼ to 6 inches	70½	65½	74	64
⅜ and ½ inch	71½	59½	69½	57½
7 to 12 inches	70½	55½	68	53½
Extra Strong Plain Ends.				
⅛ to ¾ inch	60½	48½	58½	46½
½ to 4 inches	67½	55½	65½	53½
4½ to 8 inches	63½	51½	61½	49½
Double extra strong plain ends, ½ to 8 inches	57	46	55	44

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel.	Iron.
1 to 1½ inches	46	43
1¾ to 2½ inches	58	43
2½ inches	60	48
2¾ to 5 inches	66	55
6 to 13 inches	58	43

Less than carloads 2 points less.

Wire and Wire Nails.—While the new business is not heavy, the movement from jobbers' stocks is heavy, and considerable buying is soon expected to fill out depleted stocks. We quote as follows: Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85, and less than carloads, $1.95; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30 cents for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in ten days. Iron cut nails are held at $1.85 Pittsburg, and steel at $1.75.

Structural Material.—The American Bridge Co. has been awarded the contract for erecting the steel docks for the Illinois Central railroad at New Orleans, amounting to 2,500 tons, and the contract for the steel work on the Colonial Hotel annex in this city requiring 1,200 tons. This company will also shortly begin work on the first of the buildings of the Carnegie technical schools, the contract for which has been awarded. On light angles and other shapes all of the mills are from two to three months behind, while fairly prompt deliveries can be made on the heavier sections. We quote: Beams and channels up to 15 in., 1.60c; over 15 in., 1.70c; angles, 3 x 2 up to 6 x 6, 1.60c; zees, 1.50c; tees, 1.65c; angles from 3 to 16 in., 1.60c; universal and sheared plates, 6¼ to 14 in., inclusive, 1.50c; over 14 in., 1.60c base.

Merchant Steel.—Both new business and specifications on new contracts are heavy and the local mills are busier than they have been in two years. The shipments of shafting have also greatly increased, the output of the Jones & Laughlin Steel Co.'s shafting department in March having been heavier than at any time in the past year. We quote as follows: Cold rolled and ground shafting, 50 percent off in carload lots, and 45 off in less than car lots, delivered in base territory; tire steel, 1.65c to 1.75c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.75c to 1.85c; smooth finished machinery steel, 1.80c to 1.85c; toe calk, 2.05c to 2.15c.

Old Material.—The outcome of scrap has greatly increased with the milder weather and western shipments into this district have increased owing to the better prices offered here. Heavy melting stock can still be purchased at $16.25 to $16.50, delivered in small lots, but large tonnages command $16.75. We quote, gross tons, as follows: Heavy melting stock, $16.25 to $16.75; cast scrap, $15 to $15.50; sheet scrap, $14.75 to 15.25; cast borings, $10.75 to $11.

Coke.—The producers in the Connellsville region continue to flood the market with both furnace and foundry coke and as a result prices are temporarily low. Furnace coke for prompt delivery can be had as low as $2.15 and numerous sales have been made at $2.25, while foundry coke is held at $2.85 to $3. The accumulated stocks in both the upper and lower regions are rapidly being worked off and when this coke is disposed of better prices will prevail. During the week ending March 25, the production of the upper regions amounted to 266,095 tons, while the lower region produced 80,983 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, April 4.

Some large contracts for iron and steel were closed up here last week. The building interests of Chicago were the principal buyers, these taking over 10,000 tons of structural shapes and 2,000 tons of castings. There was also an order for 8,400 tons of cast iron pipe placed by the local municipality on the 31st, the successful bidder being the United States Cast Iron Pipe & Foundry Co. In raw materials, the pig iron purchase of the leading agricultural machinery manufacturer, amounting approximately to 3,000 tons, was of the most importance, though the sale of 10,000 tons of scrap by the Illinois Central to local dealers and consumers was a transaction of first rank to these interests. No decrease is to be noted in the current demand for iron and steel generally, the effort of Western producers now being to avoid further new tonnage rather than to add to that already on their books. The local plate mill is 60 days behind in deliveries, and is in receipt of specifications each day of double its daily capacity. The announcement of the same company that it had withdrawn from the rail market seems only to have served as an incentive to new buyers, the inquiry for heavy rails continuing of an insistent nature and of active proportions. Bar iron alone is quiet and weak, due to the competition of steel makers, and this product is selling at prices ranging from 1.57½c to 1.65c Chicago, according to the desirability of the order. The continued warm weather has furnished an active stimulant to the wire trade, the demand for poultry netting, bale ties, fencing, etc., being of the heaviest kind. Intermediate rolled products are scarce, and forging billets are now selling at a minimum of $29 Chicago. Black and galvanized sheets are strong, one local maker asking a premium of $1 a ton on quick deliveries. On all other products the market is in as healthy a condition as could be desired.

Pig Iron.—The week has been marked by no developments of special interest. The market holds its own remarkably well, current business continuing of such steady proportions as to warrant the assumption that the buying movement will be prolonged for an indefinite period. The principal transactions of the week past were the purchase by an agricultural implement manufacturer of 3,000 tons of pig iron, and the letting of a contract for a local structure which calls for 2,000 tons of castings. Western foundries generally appear very busy, the most satisfactory phase of the situation being that the smaller melters are filled up with work. These interests have been buying iron freely of late, and while individually their orders are small, the aggregate tonnage is of no mean proportions. Prices of both Northern and Southern grades are maintained on the basis of $17.50 and $13.50 Chicago, respectively, for No. 2 foundry, though it is said there was close figuring, with hints at shaded prices in connection with the harvester order. We quote as follows:

Lake Superior charcoal	$18 50
Northern Foundry No. 1	18 00
Northern Foundry No. 2	17 50
Northern Foundry No. 3	17 00
Northern Scotch Foundry	18 50
Ohio Strong Softeners No. 1	19 30 to 19 80
Ohio Strong Softeners No. 2	18 30 to 18 80

Southern Foundry No. 1	17 65 to 18 15
Southern Foundry No. 2	17 15 to 17 65
Southern Foundry No. 3	16 65 to 17 15
Southern Foundry No. 4	16 40 to 16 90
Southern No. 1 Soft	17 65 to 18 15
Southern No. 2 Soft	17 15 to 17 90
Southern Gray Forge	16 40
Southern Mottled	16 40
Southern Silveries (4% to 6% Silicon)	18 65 to 19 15
Jackson Co. Silveries (6% to 8% Silicon)	21 30 to 22 30
Jackson Co. Silveries (8% to 10% Silicon)	22 30 to 23 30
Alabama and Georgia Car Wheel	21 15
Malleable Bessemer	17 50
Basic iron	17 65 to 18 15

Billets.—The scarcity of intermediate rolled products has resulted in a very firm market. Forging billets are quoted $1 a ton higher than a week ago, and wire rods are selling strong at $35 Pittsburg. Rerolling steel cannot be obtained in this market except at stiff premiums. Our quotations below are subject to change according to the tonnage called for and the relations between the buyer and seller. We quote forging billets, 4 x 4 and larger, up to but not including 10 x 10, up to .25 carbon, $29; up to but not including .60 carbon, $1 extra. Rerolling billets, Bessemer or open-hearth, 4 x 4 and larger, $26 and upwards; billets, 3⅞ in. and smaller and sheet and tin bars, $27 and upwards; according to tonnage and delivery.

Bars.—The Western situation is without material change from the condition reported a week ago. Steel bar mills are filled to the limit with specifications, consumers being insistent for quick shipments. Manufacturers of bar iron, however, are not so well off. Demand continues light and prices are unsteady. A desirable order would doubtless bring out a variety of quotations. We quote carload lots, mill shipments, Chicago delivery; Bar iron 1.57½ to 1.65c; Bessemer and open-hearth bars and bands, 1.66½c base, half extras; soft steel angles, less than 3 x 3, 1.76½c; hard steel angles, rolled from old rails, 1.60c to 1.65c; hoops, 1.81½c base, full extras. There is a brisk demand from warehouse stocks, and store quotations are very firm. We quote bar iron 1.90c to 2c base, full extras; soft steel bars and bands, 1.85c to 1.95c base, full extras; soft steel angles, channels and tees, 1.95c to 2.05c; hoops, 2.10c base, full extras.

Sheets. Demand for sheets continues without diminution. Consumers are specifying for wants several weeks ahead fearing they will be unable to get shipments later. In all departments, the market is exceptionally strong, some interests commencing to ask premiums on orders for quick delivery. We quote carload lots, mill shipments, Chicago delivery, as follows: Blue annealed sheets, Nos. 9 and 10, 1.86½c to 1.91½c; Nos. 11 and 12, 1.91½c to 1.96½c; Nos. 13 and 14, 1.96½c to 2.01½c; Nos. 15 and 16, 2.06½c to 2.11½c. On box annealed, one pass cold rolled, we quote Nos. 18 and 20, 2.31½c to 2.36½c; Nos. 22 and 24, 2.36½c to 2.41½c; Nos. 25 and 26, 2.41½c to 2.46½c; No. 27, 2.46½c to 2.51½c; No. 28, 2.56½c to 2.61½c; No. 29, 2.66½c to 2.71½c; No. 30, 2.76½c to 2.81½c. Store prices have also been advanced, and we quote on lots from warehouse stocks as follows: No. 10, 2.10c to 2.15c; No. 12, 2.15c to 2.20c; No. 14, 2.20c to 2.25c; No. 16, 2.30c to 2.35c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.70c to 2.75c; No. 27, 2.80c to 2.85c; No. 28, 2.90c to 2.95c; No. 29, 3c to 3.05c. Galvanized sheets, mill shipments, Chicago delivery, are quoted as follows: Nos. 12 and 14, 2.56½c; No. 16, 2.71½c; Nos. 18 and 21, 2.86½c; Nos. 22 and 24, 3.01½c; No. 26, 3.21½c; No. 27, 3.41½c; No. 28, 3.61½c; No. 29, 3.86½c. Jobbers' prices on lots from store have also been revised, and are now as follows: Nos. 10 to 14 inclusive, 3.10c; No. 16, 3c; Nos. 18 and 20, 3.10c; Nos. 22 and 24, 3.25c; No. 26, 3.50c; No. 27, 3.70c; No. 28, 3.95c; No. 29, 4.40c; No. 30, 4.85c.

Structural Steel.—Several of the building contracts mentioned in this paragraph last week as pending have since been closed up. Among these was the Boston Store, whose extensions will require between 7,000 and 8,000 tons of steel. This contract was let to the Fuller Co. In addition, the contract for the Sears Roebuck & Co.'s building was let, calling for 2,000 tons of structural shapes and 2,000 tons of castings. The contract for the Northern Trust Co.'s bank building was also let, which will require between 600 and 700 tons of structural shapes. Several other building projects are under consideration, and the outlook in this line is very bright. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in. inclusive, 1.76½c; angles, 3 to 6 in., ¼ in. and heavier, 1.76½c; angles larger than 6 in., on one or both legs, 1.86½c; beams larger than 15 in., 1.86½c; zees, 3 in. and over, 1.76½c; tees, 3 in. and over, 1.86½c; with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. We quote prices from store as follows: 2c to 2.10c for angles, beams and channels, base sizes, with 2.10c to 2.20c for 18, 20 and 24-in. beams; tees and zees, 2.05c to 2.15c. These prices are for either random lengths or cut to specifications in excess of 5 ft.

Plates.—No cessation is apparent in the demand for this product. The Illinois Steel Co. is from 60 to 90 days behind in deliveries and is receiving specifications each day far in excess of its output. New tonnage is being referred to Eastern Mills. Prices are strong and without change. We quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ in. and heavier, 6⅛ in. to 14 in. wide, rectangular plates only, 1.66½c; over 14 in. to 100 in., 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges, 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Store prices have also been advanced. Revised quotations are as follows: Tank steel, ¼ in. and heavier, up to and including 72 in. wide, 2c; over 72 in. wide up to 100 in., 2.10c; over 100 in. wide usual mill extras; 3-16 in. up to but not including 72 in. wide, 2.10c; 3-16 in., 72 in. wide, 2.35c; flange steel, 25c extra; heads, 25c extra.

Rails and Track Supplies.—Continued good demand exists for standard sections, mostly from interurban roads. Practically all these inquiries go to Eastern mills. Light rails are active and prices stronger. Specifications for track supplies are to the full capacity of Western mills. We quote heavy sections in 500-ton lots and over f. o. b. mill, $28; less than 500 tons to carload lots, $30; less than carload lots, $32. Light rails are as follows: 12-lb. sections, $27; 16-lb., $26; 20 and 25-lb., $25; 30, 35, 40 and 45-lb. sections, $24, all f. o. b. Milwaukee mill. Track supplies, f. o. b. Joliet mill: Angle bars, 1.40c to 1.50c; spikes, first quality, 1.70c to 1.75c; track bolts, 3¼ x ¾, with square nuts, 2.40c to 2.50c per lb., with hexagon nuts, 2.55c to 2.65c.

Merchant Steel.—All that can be said this week is that mills continue sold up to their full capacity and are declining to take on new tonnage. Specifications are heavy. Prices are without change and on carload lots, mill shipments, Chicago delivery, are as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c; plow steel, 2.20c and upwards, according to quality; toe calk steel, 2.21½c. Cold rolled shafting, 50 percent off in carload lots and 45 percent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and upwards.

Merchant Pipe.—Producers report no diminution in the volume of specifications. They are operating to their full capacity, but cannot keep pace with the demand for quick deliveries. We quote carload lots, mill shipments, random lengths, f. o. b. mill, as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ¼ inches	65.85	49.85	63.85	47.85
⅜ to ½ inches	69.85	57.85	67.85	55.85
¾ to 6 inches	73.85	63.85	72.35	62.35
7 to 12 inches	68.85	53.85	67.35	51.85

EXTRA STRONG PIPE.				
⅛ to ⅜ inches	58.85	46.85	56.85	44.85
½ to 4 inches	65.85	53.85	63.85	51.85
4½ to 8 inches	61.85	49.85	59.85	47.85
DOUBLE EXTRA STRONG PIPE.				
½ to 8 inches	54.85	43.85	52.85	41.85

Boiler Tubes.—The demand for seamless and locomotive tubes is of excellent proportions, while the tonnage from the general trade grows greater weekly. Prices are without change. We quote carload lots, mill shipments, Chicago delivery, as follows:

BOILER TUBES.	Steel.	Iron.	Seamless.
1 to 1½ inches	42.35	39.35	53.00
1¾ to 2¼ inches	54.35	39.35	40.00
2½ inches	56.35	44.35	43.00
2¾ to 5 inches	62.35	51.35	
			Up to 4½ inches 50.50
6 to 13 inches	54.35	39.35	

Less than carload lots from store, as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	37½
2¾ to 5 inches, inclusive	60	47½	47½
6 inches and larger	50	35	

Cast Iron Pipe.—The only contract of importance closed in the past week was the Chicago lot of 8,400 tons which went to the leading producer. The Alpena contract has been postponed again. The Portland, Ore. and Winnipeg, Man. inquiries do not come up before the middle of the month. Prices are firm. We quote carload lots, Chicago delivery, as follows: 4-in., $29; 6-in. and larger, $28; gas pipe, $1 a ton higher.

Wire Products.—All indications point to an exceptionally heavy trade in wire materials. The open weather that has prevailed since early March has flooded manufacturers with orders and specifications a month earlier than usual. The bale tie and poultry netting trade which has recently started up has only added to the difficulties of the situation. Mills are getting behind in deliveries. Prices are strong, though no advance is contemplated in the immediate future. We quote carload lots to jobbers, Chicago delivery, as follows: Wire nails, $1.95; painted barb wire, $2.10; galvanized barb wire, $2.40; smooth annealed wire, $1.80; smooth galvanized wire, $2.10; polished staples, $2.05; galvanized staples, $2.35. Less than carload lots to jobbers are 5 cents higher than above prices. The retail trade is quoted 5 cents extra over the foregoing on carload lots, and 10 cents extra on less than carload lots. Bale ties are unchanged at 82½ and 5 percent and 85 percent discount f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet and DeKalb, with actual freight allowed not exceeding 30 cents per 100 lb.

Foundry Coke.—The absence of demurrage coke on local tracks in the past week has strengthened the market. Demand, however, is not very active. We quote Connellsville 72-hour foundry, $3 at the ovens, or $5.65 Chicago. Less popular brands of Virginia and West Virginia cokes are selling at $2.50 to $2.75 at the ovens. Wise County, Va. cokes are weaker, and are quoted from $2.75 to $3 at the ovens.

Old Material.—This principal transaction of interest in this market last week was the sale by the Illinois Central of 10,000 tons of scrap. No definite information can be obtained as yet of the prices at which the different grades went, though it is stated they were fairly representative of the local market. The consumptive demand continues light, buyers regarding the market as too high in comparison with the price of finished materials to warrant much trading at prevailing values. Our quotations on gross tons are as follows:

Old steel rails (4 feet and over)	$15 50 to 16 00
Old steel rails (less than 4 feet)	16 00 to 16 50
Old iron rails	19 50 to 20 00
Relaying rails, subject to inspection	22 00 to 22 50
Relaying rails, without inspection	20 00 to 20 50
Old wheels	16 00 to 16 50
Heavy melting steel	14 50 to 15 00
Mixed country steel	12 00 to 12 50
Low phosphorus scrap (.05 and under)	14 50 to 15 00

The following quotations are for net tons:

No. 1 R. R. wrought	16 50 to 17 00
No. 2 R. R. wrought	15 50 to 16 00
Shafting	17 50 to 18 00
Dealers' forge, No. 1	12 00 to 12 50
Wrought pipe and flues	11 50 to 12 00
No. 1 cast, 150 lb. and less	13 50 to 14 00
No. 1 mill	11 00 to 11 50
No. 1 Busheling	11 50 to 12 00
No. 2 Busheling	10 50 to 11 00
Country sheet	8 00 to 8 50
No. 1 boilers, cut	11 50 to 12 00
Boiler punchings	13 50 to 14 00
Iron car axles	21 00 to 21 50
Steel car axles	16 50 to 17 00
Iron axle turnings	11 50 to 12 00
Steel axle turnings	11 00 to 11 50
Cast borings	8 00 to 8 50
Mixed borings, etc.	8 00 to 8 50
Machine shop turnings	11 00 to 11 50
Railroad malleable	13 50 to 14 00
Agricultural malleable	12 00 to 13 00
Stove plate and light cast scrap	11 00 to 11 50
Old iron splice bars	18 00 to 18 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, April 5.

Iron Ore.—Statistics compiled by the Lake Superior Iron Ore Association show that on March 1 there were 4,530,032 tons of ore on Lake Erie docks against 6,144,423 tons on March 1, 1904. As there were 5,763,399 tons on docks Dec. 1 last, 1,233,367 tons were moved from docks to furnaces during the winter and it is perfectly safe to estimate that at least 1,500,000 tons will be moved before May 1, so that at that time there will be about 3,000,000 tons on docks, against 4,534,103 on the same date in 1904, 3,592,194 in 1903 and 2,848,194 in 1902. In will, indeed, not be surprising if the ore in dock May 1 is less than it was in 1902.

The questions relating to hours and wages of longshoremen have not been settled, but, as the conferences with this union are always prolonged, the delay this year is not indicative of probable failure to agree.

Very little ore is being sold nowadays and desirable grades are scarce. Quotations are as follows: Old range Bessemer (56.70 percent iron natural, .045 phosphorus,) $3.85 to $4; Mesabi Bessemer, same content, $3.65 to $3.75; old range non-Bessemer ($52.80, percent iron natural) $3.35; Mesabi non-Bessemer ($52.80 percent iron) $3.20.

Pig Iron.—The United States Steel Corporation has purchased 35,000 tons of Bessemer at $15.50, taking 25,000 from the Bessemer Association and 10,000 from two other interests. It is understood that of the 10,000 tons, 6,000 will be shipped from Cleveland to the Lorain tube works. The market in foundry iron is rather quiet. Traveling representatives of Cleveland firms say that the demand east of this city is very good, but that north and west, very little business is being done. Michigan and Indiana consumers are especially slow about placing orders. Prices remain firm and unchanged on foundry grades. Basic has been sold as high as $16, Valley. We quote as follows, Cleveland delivery:

Bessemer	$16 25 to 16 35
No. 1 Foundry	16 75 to 17 00
No. 2 Foundry	16 25 to 16 50
No. 3 Foundry	15 50 to 15 75
No. 2 Southern	17 35
Gray Forge	15 75 to 16 00
Gray Forge, Southern	15 85 to 16 00
Lake Superior charcoal	18 00 to 18 50

Finished Material.—The principal producer finds its orders continue to pile up and it is not now able to promise delivery of plates and shapes in less than four months. It is understood that so great is the pressure for plates from car companies that the steel corporation is negotiating for the purchase of plates from other concerns. Delivery of steel bars is delayed from six to eight months on ordinary sizes and three months on irregular orders. The demand for steel bars at 1.59½c Cleveland or 1.50c Pittsburg, has increased in spite of the fact that its principal buyers are covered. The demand for bar iron at 1.60c to 1.65c at the mill has also improved. Business in sheets is good. Deliveries on galvanized are far behind. The prices of the principal producers through jobbers are as follows: Cleveland delivery, the freight from

Pittsburg being 9½ cents: Mill sales of black sheets in carload lots, No. 10, 1.89½c; Nos. 11-12, 1.94½c; No. 14, 2.04½c; No. 16, 2.09½c; No. 27, 2.49½c; No 28, 2.59½c. Galvanized, mill sales, No. 14, 2.64½c; No. 16, 2.74¼c; Nos 18-20, 2.89½c; Nos. 22-24, 3.04½c; Nos. 25-26, 3.24½c; No. 27, 3.44 1-3c; No. 28, 3.64½c. Out of stock, black sheets, ¼ in., 1.95c; 3-16 in., 2.05c. Blue annealed, No. 10, 2.15c; No 12, 2.20c; No. 14, 2.25c; No. 16, 2.35c. One pass cold rolled: Nos 18-20, 2.55c; Nos. 22-24, 2.60c; No. 26, 2.65c; No 27, 2.70c; No. 28, 2.80c; No. 30, 3.20c. Galvanized out of stock, No. 16, 2.95c; Nos. 18-20, 3.05c; Nos. 22-24, 3.20c; No. 26, 3.40c.

Old Material.—The mills have been using scrap purchased on contracts months ago and are very slow in placing new orders. Demand is slack, but prices are unchanged. We quote as follows, gross tons, Cleveland:

Old iron rails	$22 50 to 23 00
Old steel rails (over 6 feet)	16 00 to 16 50
Old steel rails (under 6 feet)	16 00 to 16 50
Old car wheels	16 00 to 16 50
Steel boiler plate	13 00 to 13 50
Steel axles	17 50 to 18 00
Malleable iron (railroad)	15 50 to 16 00
Malleable iron (agricultural)	14 50 to 15 00
Heavy steel	16 00 to 16 50

We quote as follows, net tons:

No. 1 R. R. wrought	16 50 to 17 00
No. 1 busheling	14 00 to 14 50
No. 1 machine cast	14 50 to 15 00
Iron axles	22 00 to 22 50
Axle turnings	12 00 to 12 50
Wrought turnings (free from cast)	11 50 to 12 00
Grate bars	10 00 to 10 50
Pipes and flues	12 50 to 13 00
Tank iron	10 50 to 11 00
Hoop and band iron	9 00 to 10 00
Sheet iron	7 00 to 8 00
Wrought drillings	11 50 to 12 00
Stove plate	10 50 to 11 00
Cast borings	8 00 to 8 50

CINCINNATI.

April 4.

Coke.—The market is easy, with foundry coke quoted at $2.75 to $3 f. o. b. Connellsville. Furnace coke has sold at about $2.35, and on contracts at $2.25 f. o. b. ovens.

Pig Iron.—In Southern iron the week has been perhaps the quietest with Cincinnati sales agencies since the opening of the year, so far as orders are concerned. There are no large inquiries pending and those who come in direct contact with foundrymen report but little in the way of encouragement for foundry iron. In Northern irons business in this territory has been unimportant, but sales of small lots aggregated a fair tonnage. Prices are without change and $13.50 Birmingham for No. 2 foundry and $15.75 furnace for Ohio irons appear to be minimum quotations. Southern furnaces are now generally willing to book business for any delivery in the second half of the year on the basis of $13.50. The jobbing foundry trade is quiet and buyers' statements as to their having enough iron on hand to run them up to July 1 at the present rate of consumption appear to be generally credited. The cost of making pig iron in the North is attracting some attention, in view of the near opening of navigation which will mean higher priced ore entering into furnace mixtures; also in view of the increased cost of coke in the second half and the demands for higher wages at some furnaces. In spite of the dullness of the past week, the trade generally is hopeful for the future. So far as Southern irons are concerned, the furnaces do not appear to be accumulating iron and have already booked considerable tonnage into the third quarter, so that the tone of correspondence from the South indicates a confident feeling on the part of the Southern iron makers. This belief in the stability of the market is emphasized by the rigid way in which the schedule of prices is maintained. We quote f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$16 75 to 17 00
Southern Foundry No. 2	16 25 to 16 50
Southern Foundry No. 3	15 75 to 16 00
Southern Foundry No. 4	15 25 to 15 50
Southern Foundry No. 1, soft	16 75 to 17 00
Southern Foundry No. 2, soft	16 25 to 16 50
Gray Forge	15 00 to 15 25
Northern Foundry No. 1	17 40 to 17 65
Northern Foundry No. 2	16 90 to 17 15
Northern Foundry No. 3	16 40 to 16 65
Southern Charcoal	19 50 to 19 75

Finished Material.—The demand is active and jobbers report difficulty in filling orders. They are harassed by shortage in stocks and slow mill shipments. This applies particularly to articles of steel manufacture. Bar iron remains unchanged and comparatively quiet. Bar iron is quoted at 1.60c to 1.65c; steel bars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets at 75 and 7½ percent off. We quote black sheets, No. 27, at 2.40c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2.05c; No. 10, 2c. Tank plates are firm and sell out of store at 2c for ¼-in. and 2.10c for 3-16, No. 8 and No. 10. Beams and channels are quoted at 2c from stock, and angles at 2c to 2.05c for base sizes.

In merchant pipe there is a continued fair demand and so far as prices are concerned there is a stronger tendency to adhere to the schedule, so that quotations represent the market for the independents as well as the leading interests. We quote f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe.		Guaranteed. Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ and ¼ inches	65.85	49.85	63.85	47.85
⅜ and ½ inches	69.85	57.85	67.85	55.85
¾ to 6 inches	73.85	63.85	77.35	62.35
7 to 12 inches	68.85	53.85	67.35	51.85

Old Material.—The market is quiet but there is some increase in inquiry, but no material change in orders. We quote,

Old No. 1 railroad wrought, net tons	$16 50 to 17 00
Cast machine and foundry, net tons	13 50 to 14 00
Old iron rails, gross tons	20 00 to 21 00
Old steel rails, gross tons	15 00 to 15 50
Old short lengths, gross tons	14 00 to 14 50
Old iron axles, net tons	19 00 to 20 00
Stove plate, net tons	9 50 to 10 00
Wrought turnings, net tons	12 50 to 13 00
Cast borings, net tons	9 00 to 9 50

PHILADELPHIA.

April 4.

There is no cessation in the heavy iron and steel business that has marked the past few months, and no indication of any let-up in the immediate future. With mills and furnaces running to their full capacity, and both producers and consumers expressing themselves well satisfied with the present scale of prices, the outlook continues bright for a record-breaking year. So confident of the future are the furnacemen that a number have made voluntary advances in wages averaging about 10 percent. It is significant that with large orders already placed for the third and fourth quarters, some consumers are making inquiries about deliveries in 1906. It cannot be learned, however, that any important orders have been placed, producers being generally unwilling to give figures beyond the present year.

Pig Iron.—With the dangers of a runaway market ever before them, producers and consumers alike seem satisfied to stand by present prices. An interesting event of the past week was the sale of 30,000 tons of basic pig iron for mills in the immediate vicinity of Philadelphia for delivery in the third and fourth quarters at from $16.60 to $16.75. Three mills were buyers, one taking 15,000 tons in two lots, another 12,000 tons in two lots, and the third 3,000 tons. There has been no diminution in orders from 100 to 1,000 ton lots. Most of the furnaces have pretty well sold out their output for the next six months. Prices, which show no change, may be quoted as follows:

No. 1X Foundry	$18 25 to 18 50
No. 2X Foundry	17 75 to 18 00
No. 2 plain	17 25 to 17 50
Standard gray forge	16 00 to 16 50
Ordinary gray forge	15 50 to 15 75
Basic	16 75 to 17 00
Low phosphorus	20 25 to 20 50

Finished Material.—Prices continue firm, the volume of business being so great that there is no necessity for making

concessions. If the present scale of demand continues higher figures are looked for, but for the present we continue to quote: Beams, channel and angles, according to specifications, 1.73½c to 1.80c; refined iron bars, 1.73½c to 1.80c; steel bars, 1.63½c to 1.70c; plates, 1.73½c to 1.75c.

Old Material.—The market is rather quiet, the mills holding off from large purchases because of the high prices, while sellers stand firm, believing that if the present tremendous output of iron and steel continues the mills must come to their figures. The tendency seems to favor their point of view. For deliveries in buyers' yard the quotations are:

Old steel rails	$18 00 to 18 25
No. 1 steel scrap	17 75 to 18 25
Old steel axles	22 50 to 23 00
Old iron axles	26 50 to 27 25
Old iron rails	25 00 to 25 50
Old car wheels	17 00 to 17 50
Choice scrap, R. R. No. 1 wrought	22 50 to 23 00
No. 1 yard scrap	20 00 to 20 50
Machinery scrap	16 00 to 16 50
Low phosphorus scrap	21 50 to 22 50
Wrought iron pipe	16 25 to 16 75
No. 1 forge fire scrap	16 50 to 17 00
No. 2 forge fire scrap, ordinary	13 00 to 13 50
Wrought turnings	15 00 to 15 50
Axle turnings, heavy	16 25 to 16 75
Cast borings	11 50 to 12 00
Stove plates	13 50 to 14 00

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., April 4.

Although several important conferences were held in the week in reference to the proposed Southern iron merger, nothing tangible has yet come as a result of them. The interests which are pushing the consolidation seem actuated by a dogged determination to bring it about, and the belief is strong in financial circles that they will be able to do so. Newspaper reports that the details of the consolidation have been practically arranged are untrue, but there is no doubt that the negotiations have reached a point where their successful termination may be announced any day. President Maben, of the Sloss-Sheffield Steel & Iron Co., said yesterday that no definite proposition had yet been made to his company, and that, so far as it was concerned, there was no change in the situation from that he outlined in *The Iron Trade Review* last week.

Pig Iron.—The activity noted in the local pig iron market for the past month continued during the week under review. The tonnage of sales was large, with foundry grades again making up the greater part of them. One of the largest single transactions was for 2,700 tons of Northern foundry, which was taken by a New Haven hardware concern. The leading pipe interest bought largely also. Prices show no change, unless it be that they are not quite as firm as they have been, both Northern and Southern furnaces taking orders at the minimum quotations that have prevailed for weeks past. It is still possible to purchase Northern No. 2 on the basis of $16.50 at Eastern Pennsylvania furnaces, although some producers are quoting $16.75. In Southern irons, No. 2 foundry can easily be obtained at $13.50 Birmingham, although some furnaces still talk $13.75. It is noticed, too, that the furnaces are more willing to take orders at prevailing prices for delivery through the year than they have been. The 2,700 tons mentioned above was for such delivery. Iron imports are again being discussed, but in consequence of increased ocean freight rates, the domestic product can be obtained at seaboard points at least 50 cents per ton cheaper. New York quotations at tidewater follow: Northern No. 1 foundry, $17.75 to $18.25; No. 2 foundry, $17.25 to $17.75; No. 2 plain, $16.75 to $17.25; Southern No. 1 foundry, $17.75 to $18; No. 2 foundry, $17.25 to $17.50; No. 3 foundry, $16.75 to $17; No. 4 foundry, $16.25 to $16.50. Pig iron warrants are as follows:

	Bid.	Asked.
April	$16.40	$17.00
May	16.45	17.00
June	16.50	17.00
July	16.50	17.00
October	16.50	17.00
February	16.50	17.00

Finished Iron and Steel.—The structural material market during the week was more noteworthy for the tonnage in prospect than that closed. Local business is looking up and it is estimated that there are at least 20,000 tons that will likely be contracted for in the near future. The railroad outlook offers considerable encouragement also. The only important order of the week was for 4,000 tons given by the New York Central Road. This was part of the 7,500 tons for which the company has had specifications out for months. It went to the American Bridge Co., whose March bookings aggregated about 50,000 tons. The company considers 40,000 tons a normal month. The plate trade continues active, with some mills displaying less energy than a month ago in seeking orders. In bars and sheets new business has been fairly good. We quote New York prices at tidewater: Angles, 3 to 6 in. x ¼ in. and heavier, 1.74½c; beams, 3 to 15 in., 1.74½c; channels, 3 to 15 in., 1.74½c; beams, 18, 20 and 24 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.79½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary firebox, 1.94½c; refined iron bars, 1.64½c; soft steel bars, 1.64½c to 1.67c; sheets, in carload lots, New York, No. 28, black, 2.60c to 2.65c; galvanized, 3.65c to 3.70c.

Old Material.—Transactions were on a larger scale than in the week previous, due largely to holders being more inclined to listen to bidders. Prices on the whole are as strong as ever, but in some of the minor items a little weakness has been discernible, as a result of heavy offerings. Heavy steel scrap remains especially firm. Approximate prices f. o. b. New York follow:

Old iron rails	$20 00 to 22 00
Old steel rails, long lengths	16 00 to 17 00
Old steel rails, short pieces	15 50 to 16 50
Relaying rails	21 00 to 22 00
Old car wheels	17 50 to 18 25
Old iron car axles	21 75 to 22 75
Old steel car axles	19 00 to 19 75
Heavy melting steel scrap	16 00 to 17 00
No. 1 railroad wrought scrap	20 00 to 20 50
Iron track scrap	17 00 to 18 50
Wrought pipe	15 00 to 15 50
Ordinary light iron	12 00 to 13 00
Cast borings	10 00 to 10 50
Wrought turnings	13 50 to 14 00
No. 1 machinery cast	16 00 to 16 50
Stove plate	13 50 to 14 00

BIRMINGHAM.

BIRMINGHAM, Ala., April 3.—While no large single sale of pig iron was made in the Birmingham district in the week, the market is steady and the aggregate of small orders taken of late is good. Sales now being made are for third and fourth quarters delivery; in fact, there is much being sold for delivery during the latter part of the year. The local consumption of iron is quite extensive, the cast iron pipe works in particular using a large quantity of iron. These works are doing splendidly, shipping their product almost as rapidly as they are producing same. Quotations for pig iron are given as follows: No. 1 foundry, $14 to $14.50; No. 2 foundry, $13.50 to $14; No. 3 foundry, $13 to $13.25; No. 4 foundry, $12.50 to $13; gray forge, $12 to $12.25; No. 1 soft, $14 to $14.50; No. 2 soft, $13.50 to $14.

The production of pig iron in Alabama bids fair to show considerable improvement before the end of this month. The Tennessee Coal, Iron & Railroad Co. has two furnaces in operation at Bessemer and when the coke ovens at Pratt City, recently started up, are making sufficient coke another stack will be started at Bessemer. The Woodward Iron Co. will be able to start up its new furnace at Woodward in the near future, but one of the old furnaces will need some repairing. The Alabama Steel & Wire Co. will be able to resume operations at its Gadsden furnace, the Virginia coal mine being in operation again.

The strike of the union coal miners continues in this State, but at mines where non-union labor has been introduced the output is improving some and the Tennessee company in particular has found it possible to start up some of their coke ovens which have been out of blast since the strike began last July. The importation of coke from West Virginia continues.

The statement is made that W. P. Pinckard, who owns and operates good coal and ore mines in Tuscaloosa county, within three or four miles of one another, is making arrangements to erect a modern furnace near Clements or Dudley, Ala., on the Alabama Great Southern railroad.

The steel rod, wire and nail mills of the Alabama Steel & Wire Co. have been working day and night for some time on orders received for wire, a large order in particular for barbed wire being filled to Cuba. The company is still manufacturing steel at its Gadsden plant, the iron for which was stocked on the yards before the furnace closed down for lack of coke.

The opinion is expressed in the Birmingham district that a merger of Southern coal and iron interests will be brought about during the next three months.

The Metal Market.

NEW YORK.

ROOM 1315, No. 150 NASSAU ST., April 4. (OFFICE OF *The Iron Trade Review.*)

Pig Tin.—The market during the week took on increased strength, the publication of the monthly statistics by Secretary D. Mayer, of the New York Metal Exchange, showing a better statistical situation than had been expected. Trade, however, remains quiet, with no immediate prospect of growing better. The monthly statistics show the total arrivals and deliveries during March to have been 3,060 and 4,000 tons respectively, and the total visible at the end of the month to have been 14,592 tons as against 14,911 tons at the close of February. The shipments from the Straits amounted to 4,127 tons, as against 4,505 tons the previous month. During the week the London market was active at advancing prices. Today's closings follow: Spot, 30.15c to 30.30c; April, 29.75c to 30.25c; May, 29.50c to 30.00c; June, 29.25c to 29.75c. London's closings today follow: Spot, £139; futures, £134 10s. Arrivals at Atlantic ports for this month to date amount to 215 tons, with 4,542 tons afloat.

Copper.—The local market continues to be marked by considerable dullness, with the buying for export giving evidences of increasing. The monthly statistics show the March exports to have been 20,168 tons, as against 15,866 tons for February. The London market during the week was dull and weaker. Today's closings follow: Lake, 15¼c to 15⅜c; electrolytic, 15⅛c to 15¼c; casting, 14⅞c to 15c. London's closings today follow: Spot, £66 18s 9d; futures, £67 6s 3d.

Lead.—Locally is quiet and unchanged at 4.50c to 4.60c for spot. St. Louis remains at 4.42½c to 4.50c, according to grade. London is stronger at £12 11s 3d.

Spelter.—The market is slightly stronger, spot commanding 6c, with April and May obtainable at 5.87½c. London is unchanged at £23 12s 6d.

Antimony.—All grades are firmer, Cookson's selling at 8½c to 8⅝c, Hallett's at 8¼c to 8½c, and other brands at 7½c to 8.12½c.

Quicksilver.—We quote $38 per flask of 75 lb. lots of 100 flasks. London is £7 12s 6d.

CHICAGO.

OFFICE OF *The Iron Trade Review.*, 1164 MONADNOCK BLOCK, April 4.

There has been good buying of metals in the week under review, and prices are very firm. We quote as follows. Lake copper, in carloads, 15½c; less than carload lots, 15¾c. Casting copper in carloads, 15¼c; less than carload lots, 15½c. Spelter, 6.10c for carload lots, and 6.35c to 6.60c for smaller lots. Sheet zinc, 7¼c for carload lots of 600-lb. casks, and 7½c for less than carload lots. Pig lead, 4.50c for 50-ton lots; 4.55c for carload lots and 5c for less than carload lots. Pig lead, 4.50c for 50-ton lots; 4.55c for carload lots, and 5c for less than carload lots. Pig tin, 30½c for carload lots, and 30¾c for less than carload lots. Cookson's and Hallett's antimony, 9c. Nickel is 45c to 60c, according to amount and deliveries.

The demand for old metals is good and prices remain firm. Dealers' quotations are approximately as follows: Copper wire, 13¼c; heavy copper, 12¾c. Light copper, 11¾c. Red brass, 11¾c; red brass borings, 10⅛c. Yellow brass, 8¼c; yellow brass borings, 7½c. Pipe lead, 4c. Tea lead, 3.60c. Zinc 4¼c.

A PLANT FOR CLINKERING FLUE DUST.

A project is on foot and has assumed practical shape, for the utilization of the large quantities of flue dust that has been accumulating in recent years at the blast furnaces using the finer Mesabi ores in greater or less quantities. The proposal is now made by Hoover & Mason, of Chicago, who have developed the ore unloading machinery bearing their name, to take this flue dust, convert it into clinker by a process of their own and deliver it again to the furnaceman in a form that will make it readily reducible. Hoover & Mason expect to build a plant in the Mahoning Valley at some convenient point and to handle at this central plant all the flue dust shipped from the furnaces in the two Valleys with which they have made arrangements. Thus far contracts have been made to agglomerate the flue dust accumulated at the Mabel, Claire and Alice furnaces at Sharpsville, Pa.; the Ella furnace at West Middlesex, Pa.; the Stewart furnace at Sharon, Pa., and the two Hubbard furnaces at Hubbard, O. It is probable that the Hoover & Mason plant, on which, as well as the process, patents have been taken out, will be erected at Hubbard. It is understood that powdered coal is used in the clinkering of the fine ore, which comes from the apparatus in a form quite desirable for furnace use.

The arrangement with the furnace companies stipulates that the flue dust is to be hauled from their furnaces to the central plant and the ore clinker returned free of cost to them, they to pay for the ore at a certain stipulated amount below the cost of lumpy Lake ores of like analysis delivered at furnace. This fixed differential, which is an advantageous one to the furnaces, represents, therefore, the value which the new process imparts to what in its present state is a worthless refuse product of furnace operations. From time to time attempts have been made to utilize a certain percentage of flue dust, wetting it up and charging it in small quantities along with lumpy ore; but betwen the lessening of output and the blowing over again of a certain part of the fine stuff after the furnace heat has expelled its moisture, the results have not been at all satisfactory.

The possibility of clinkering dusty ores at the mine and shipping them in a lumpy form is a subject that will no doubt have consideration if the new process is a success. More attention has been given than ever in the past year to the question of treating fine ores, particularly flue dust, so that the waste that has been constant since Mesabi ores have been used in considerable quantities, may be avoided. In the fall of 1904 a working test was made at the Isabella furnaces, Sharpsburg, Pa., of the Brown down-draft furnace for the clinkering of flue dust. The apparatus was designed by Horace F. Brown, M. E. These tests demonstrated that flue dust can be economically converted to clinker without the addition of any flux and that by adding a certain percentage of lime a saving in fuel can be made.

PITTSBURG FOUNDRYMEN'S ASSOCIATION.

At the meeting of the Pittsburg Foundrymen's Association, held at the rooms of the Engineers' Society of Western Pennvania, at Pittsburg on April 3, two papers presented by David McLain, of Milwaukee, were read. One treated the production of steel castings historically, while the other was on the "Melting of Brass with Oil in Steel Furnaces." H. C. Babbitt, of the Westinghouse Electric & Mfg. Co., briefly related his experience with the use of a Tropenas converter for the production of steel castings, and H. M. Lane, editor of the *Foundry*, also addressed the meeting. In May a smoker will be given by the association, and an effort will be made to organize the foundry foremen and superintendents into an association as an adjunct of the Pittsburg association. Mr. McLain's paper on melting brass with oil in steel furnaces follows:

"While I was in charge of a crucible steel and iron foundry some years ago, our concern wanted to make their own brass castings, as they had considerable trouble in securing service—their castings being light and very intricate. I had never handled a brass shop, and began looking around for a man to take charge of it. I had been wondering where we could place the new department; and, as we had plenty of room in our foundry, decided to place the brass molders near the steel furnaces. I could not see why we could not melt brass in our furnaces, as we could regulate the flame to suit the work. I went around among my friends in the brass business, trying to find out whether I was right or wrong before I started.

"Before telling what they said, I will give you the conditions that existed in our foundry: We had six furnaces, two melting chambers to the furnace, and two pots to the chamber. At this time we operated from two to four furnaces per day, and six heats or twelve pots was the day's work, and the melter was through at from 2:30 to 3:30 o'clock, and the oil turned off for the day. We did not look for our steel pots to make more than three heats per pot, when the best of them were picked over and set to one side, and the balance thrown out. The ones we set aside we intended to use in case one of our pots burst in the furnace. Now, I figured, if we could use these old crucibles for melting brass it would be saving the price of brass pots; and if we could place the pot full of metal in the furnace after turning off our oil, that would help us greatly, as our company did not want to build a brass foundry until they were larger users than they were at this time.

"Now, this was the way it looked to me, and it looked right, but, as I said, I wanted to know what my brass friends thought. When I told them that I intended to melt with oil they told me it would not do. No, they had never used oil, but they knew it would burn the metal and so forth. They told me that it was a crazy idea to use those old pots; they would have small particles of steel in them and would spoil the metal. I had told our manager that I thought we could work it this way, and I wanted to try it before telling him it was no good. But it proved to be all right, so far as using the old pots and the oil was concerned.

"We would place our filled pot in the furnace immediately after pulling our last steel pot, and would have our metal melted in from 35 to 45 minutes. The castings gave good satisfaction, but, as we were a young and growing concern, we had to build a brass foundry, as we needed the room for our iron and steel molders, and we put in six brass furnaces of the regular type. But it demonstrated to our entire satisfaction that brass could be melted with oil in a steel furnace, both after our steel was melted and when we chose to light a furnace if we were in a hurry for some castings. It also proved that we were right in thinking that we could use those old pots. We have gotten as many as 16 heats from an old discarded steel pot—but about eleven heats were the average.

"After we started our brass foundry I had placed there one of the best men I could find to take charge of it—a studious, thorough mechanic. I advised him to see what he could do with those old pots, and he has gotten as many as 18 heats, but this is an exception. We talked the matter over and finally decided he should take a new steel pot, and see what he could get from that. Although he was afraid at first that probably the steel pot might affect the metal, and besides the steel pot was not as handy; but when he took the steel pot he cut a lip on each side to make easier pouring. We watched the castings in the machine shop and they were all right. We got 32 heats from the first pot, and, if I am not mistaken, 35 from the next, and our average was 31 heats for the first six pots."

Those in attendance:

Wm. H. McFadden, H. E. Field and S. McMillen, Mackintosh-Hemphill & Co.
J. S. Seaman, Seaman-Sleeth Co.
B. D. Fuller, J. S. McDonald and H. C. Babbitt, Westinghouse Elec. & Mfg. Co.
Wm. Fitzpatrick and E. D. Frohman, S. Obermayer Co.
Ralph West, James Kearns and W. F. Coburn, Mesta Machine Co.
A. W. Slocum, National Car Wheel Co.
G. C. Schade and Wm. Mahaid, Braddock Machine & Mfg. Co.
Wm. Yagle, Yagle Foundry & Machine Co.
A. O. Backert, *The Iron Trade Review*.
J. S. McCormick and T. E. Malone, J. S. McCormick Co.
J. F. Brown, Mesta Machine Co.
Wm. Hanna and Michael O'Hagen, Mackintosh-Hemphill & Co.
Mr. Phillips, Phillips & McLaren.
J. Fraser, Mackintosh-Hemphill & Co.
John A. Logan, Jones & Laughlin Steel Co.
L. G. Blunt, Westinghouse Foundry.
James Fox, H. K. Porter Co.
W. J. Reardon, Westinghouse Elec. & Mfg. Co.
C. F. White, Jones & Laughlin Steel Co.
I. S. Robeson, Philadelphia, Pa.
Paul Hay, Whiting Foundry & Equipment Co.
John Phillips, Phillips & McLaren.
P. H. Zimmers, Union Foundry & Machine Co.
A. W. Gibbs, Altoona, Pa.
Mr. Rendell, Whiting Foundry & Equipment Co.
H. M. Wilson, Taylor, Wilson & Co., Ltd.
H. M. Lane, *The Foundry*.
A. A. Lane, Taylor, Wilson & Co., Ltd.

Large Output at Clairton Steel Plant,

During the four week period in March the Clairton steel plant of the Carnegie Steel Co., Clairton, Pa., broke the record for a plant of its size, producing 42,300 gross tons of ingots. This plant contains twelve 50-ton open-hearth furnaces and the average time of heats was a trifle over eight hours. The scrap consumption was low, averaging about 28 percent, while the iron contained about 0.5 percent phosphorus and under 1 percent silicon. The iron used passed through the mixer from the Clairton furnaces.

Talbot Furnace Operations.

The Jones & Laughlin Steel Co., Pittsburg, has started the first of its four new Talbot open-hearth furnaces, making the second Talbot furnace in operation at this plant. This furnace has already produced 125 tons of steel in 24 hours, which is a good performance for a new furnace. The furnaces have a rated capacity of 200 tons daily, but the original furnace at the plant has already exceeded this. The second of the new furnaces will be ready to operate about May 1, while the other two will go in during June and July respectively. With these furnaces all in operation the open-hearth steel production will be increased 800 tons daily or 250,00 tons a year.

Second Sale of Morgantown Tin Plate Plant.

(Special Telegram.)

PITTSBURG, April 5.—The plant of the Morgantown Tin Plate Co., Morgantown, W. Va., was sold at auction sale at Wheeling yesterday. John I. Frazier, representing Reed, Smith, Shaw & Beal, Steel Corporation attorneys of Pittsburg, secured the plant on a bid of $219,900. Recently Frazier bought the plant at auction on a bid of $154,000, but Geo. C. Sturgiss, of Morgantown, representing the creditors, filed an upset bid of $200,200. The court reopened the matter with the consequent sale to Frazier.

The Alfree Engine Co., Indianapolis, Ind., was placed in the hands of L. G. Rothschild, as receiver, on complaint of J. B. Alfree, who has a claim of $25,000.

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THE TREND OF FOREIGN COMMERCE.

The monthly statement of all foreign commerce of the United States for February and the eight months ending February 28, as compiled by the Department of Commerce and Labor, is of unusual importance, as it shows that imports during February increased over those of February, 1904, under every heading, the principal increases being in imports of crude articles and articles wholly or partially manufactured for use in manufactures and in articles of food. The imports in February, 1905, were larger than in any other year in the history of our commerce and the excess of exports over imports was smaller than in any month since June, 1897. The decline in exports, as compared with February, 1904, was distributed among all classes of exports, except manufactures, which showed an increase of more than $1,000,000. The only earlier month in the history of our commerce in which imports passed the $100,000,000 line was April, 1897, when large quantities of foreign merchandise, especially sugar, were rushed in to escape the increased duties of the Dingley act, which went into effect in July of that year. The imports of February were $103,057,052 against about $89,000,000 in February, 1904. The statistics are in harmony with the general trend of the past fifteen years, which has been toward large exports of manufactured articles and imports of crude materials, a tendency which forms a strong argument in favor of the Dingley tariff.

It is interesting to compare the statistics for all foreign commerce with those relating to iron and steel. We find that the imports on articles of which the tonnage is reported have decreased 7,264 tons compared with February of last year and increased 5,163 tons compared with January, 1905. Comparing February, 1905, with February, 1904, we find the following increases: pig iron, 13,293 tons, due to pig to be manufactured into piping and exported; scrap, 837 tons; bar iron, 2,876 tons; tin and terne plates, 1,979 tons; total, 18,985; and the following decreases: rails, 7,944, there being no imports in February of this year; hoop, band or scroll, 60; crude steel, 705; sheets and plates, 924; wire rods, 537; wire and wire articles, 71; structural shapes, 1,480; total, 17,721. The importing of structural shapes has almost ceased, the tonnage for February being only 32 and for January 81. The tonnage table follows:

IMPORTS OF IRON AND STEEL TO THE UNITED STATES—GROSS TONS.

	February		8 mos. ending Feb.	
	1904	1905	1904	1905
Pig iron	3,841	17,134	161,776	61,426
Scrap	316	1,153	21,197	7,404
Bar iron	706	3,582	24,248	16,229
Iron and steel rails	7,944	....	32,595	7,996
Hoop, band or scroll	82	22	1,577	1,584
Steel ingots, slabs, billets or bars	1,514	809	88,714	6,866
Sheets and plates	1,032	108	8,987	1,350
Tin and terne plates	3,214	5,193	30,528	48,981
Wire rods	1,700	1,163	13,450	9,818
Wire and wire articles	325	254	3,501	2,317
Structural shapes	1,512	32	10,926	1,871
Total	22,186	29,450	397,496	165,342

The value of imports included in the table and of others of which tonnage is not reported, was: February, 1905, 1,703,073, against 1,552,011 in February, 1904; for the eight months, 14,343,904 for 1905 and 19,447,258 for 1904. The iron ore imports in February were 52,575 tons against 27,853 in February, 1904. For the eight months ending February last, the ore imports were 423,632 tons against 578,397 tons for the eight months ending February, 1904.

The decrease of exports was greater in February than in January, when the exports of articles on which tonnage is reported were 7,000 tons in excess of January, 1904, although 18,000 tons less than those of December, 1904, and 72,000 tons less than those of November. The exports for February are 17,000 tons less than those of February, 1904. Comparing January and February, 1905, we find the principal losses are: Pig iron, 2,871 tons; bar iron, 799 tons; steel rails, 3,767 tons; steel sheets and plates, 1,219 tons; wire, 1,727 tons. The principal increases were: Steel bars, 1,023 tons; crude steel, 6,500 tons, and structural material, 4,871 tons. The tonnage table follows:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	February		8 mos. end'g Feb	
	1904	1905	1904	1905
Pig iron	3,429	7,614	23,095	35,384
Scrap	1,443	787	9,073	16,926
Bar iron	1,687	2,923	10,962	20,933
Wire rods	513	....	8,926	12,400
Steel bars	704	2,450	9,973	16,558
Billets, ingots and blooms	26,205	14,481	48,182	165,618
Hoop, band or scroll iron	383	505	1,595	2,392
Iron rails	12	4	752	31
Steel rails	8,465	22,211	39,977	314,946
Iron sheets and plates	60	476	3,808	3,091
Steel sheets and plates	808	655	8,282	40,987
Tin plates, terne plates and taggers' tin	77	150	328	5,143
Structural material	2,950	8,651	19,971	46,742
Wire	8,041	6,580	70,046	96,367
Cut nails	737	432	6,408	5,407
Wire nails	1,786	2,355	21,716	22,837
Other nails, including tacks	287	149	1,594	2,214
Total	57,546	40,423	284,698	807,976

The value of exports of iron and steel, not including ore, but including articles on which tonnage is not reported, was, for February, $9,179,124 against $8,760,303 in the same month of 1904; for the eight months ending with February, $85,546,682 in 1905 against $67,886,083 in 1904. The exports of ore were 1,023 tons in February, 1905, against none in the same month of 1904. For the eight months, the ore exports were 208,154 tons in 1905 and 75,385 tons in 1904.

RAILROAD ACCIDENTS AND STEEL CARS.

An inquiry has been in progress recently into the causes of a railroad wreck at Clifton, Pa., on the Pennsylvania Railroad system. The second section of an excursion train en route for Washington for the President's inauguration ran into the first section. The heavy locomotive plowed its way into the coach ahead

and many passengers were injured and several killed. To add to the horrors of such an accident, the cars speedily caught fire and those imprisoned were exposed to a second danger.

A puff of smoke from the leading locomotive obscured the view of the engineer on the second half of the excursion train and he took his chances of a probably clear course. The experiment was costly. But the pressure of schedule demands is strong and the temptation to have a good running record may be the cause of many another wreck.

Numerous inventors have sought for efficient means to meet the case. The block signal system is one of these methods, and assuming that the engineer sees and heeds the indications presented by the apparatus the plan works admirably. All mechanical devices have their weaknesses, but with careful and regular supervision the block system, as shown by its remarkably clean record in Great Britain, is as safe a scheme as can well be imagined. Whether it would be wise to complicate the arrangement to the extent of having any contrivance to take the control of the train from the engineer in any manner is doubtful. This has been proposed by sundry patentees of train-stopping expedients. Some of these latter have a projecting arm which, when the danger signal is passed unheeded, reaches upward to an emergency valve and shuts off the steam from the cylinders. By a variation of this method the projecting arm strikes a valve stem and sounds a warning whistle or springs a switch and lights up an electric lamp in the cab. The added complication of the road equipment has been an effectual bar to many of the innovations. There may also be the objection that these prospective aids may not be conducive to the incessant watchfulness of the engineer himself. He may rely too implicitly upon their integrity. They would add also to the number of things necessitating constant care from others. How far this addition to railroad mechanism is desirable may be a matter for debate therefore.

There is, however, another preventive of fatalities to passengers which is less doubtful and that relates to car construction. Had the cars at Clifton been of steel they would not have split and flamed like match boxes. Steel freight cars run into wrecks, are tipped over and rolled. A crane drags them from the useless fragments of their frail neighbors of wood. The frames and trucks are readily repaired and they are promptly fit for the road.

The steel car for freight purposes is quite a modern affair. The product of the Harvey Steel Car Co. in 1892 followed after the fashion of the wagon of wooden frame, steel being substituted for some of the parts. The end and side beams, cross timbers, side stakes and bolsters were changed to steel construction, though the sides and flooring remained for a time of wood. The evolution of the all-steel car was gradual. There were critics not easily reconciled to the project, as is suggested by a report read at a car builders' association so recently as 1896. Here is a suggestive sentence, for instance, touching upon the shortcomings of construction: "It is as unjust to condemn all iron or steel car construction on account of the failures as it would be to condemn the use of wood in car construction because some of the earlier builds of cars, and even some comparatively recent designs, are so poorly proportioned that they are constantly failing." The use of steel continued to make rapid strides and the all-steel car is now a familiar type. Box cars have roof and sheathings of wood, though steel under framing, posts and braces are frequently found in combination with the timber covering.

The lessons taught by the art of steel car construction can be applied to the carrying of passengers as successfully as to the transportation of freight. This at least has been determined by the latest expression in railroad equipment, that of the New York subway. The requirements there are severe and the high schedule speeds with frequent stops meant a minimum weight, and it was equally essential to have a strong and substantial type of car. The standard car first adopted had side sills of 6-in. channels reinforced inside and out by white oak timbers. The center sills are 5-in. I-beams faced on both sides with Southern pine. The end sills are steel shapes attached to side sills by steel castings and forgings. The body bolster is made up of two rolled steel plates bolted together at the ends and supported by a steel draw casting, the ends of which support the center sills. The cross-bridging and needle beams are unusually substantial 5-in. I-beams. The maple flooring inside the car is double with asbestos fire-felt between the layers and is protected below by steel plates and asbestos board. The platform posts of steel bar are firmly bolted to the steel sills, to a steel anti-telescoping plate under the floor, and to a heavy steel angle reinforcement extending back into the car 6 ft. on either side. Should an accident occur and one platform ride over another, six square inches of metal would be sheared off the posts before the main body of the car would be reached.

Even this sturdy type of car was not considered a final form and plans were made for an all-steel construction. A sample car was the result of about fourteen months' labor and after this experience two hundred all-steel cars were ordered for the subway and many are in use. They are not strictly all-steel, but the term is a fairly expressive one. The framing is steel, the flooring of galvanized, corrugated sheet iron in combination with "monolithic" cement, the platform flooring is steel plate covered with rubber matting, the car sides, the seats and cushion frames are steel, and the moldings and window panels are aluminum. The construction is exceedingly attractive to the eye and from a sanitary point of view leaves little to be desired. In this latter respect the wooden car is far from perfect.

But in assurance of safety from collision and fire, how do these compare with the miserable traps that came to grief at Clifton? A rear end collision would not have been so likely to crumble them up in egg shell style. The locomotive would have tossed them aside or piled them ahead, but with fair chances of life to their unfortunate occupants. Many minor injuries would be occasioned by a shock, as in the Clifton calamity, even if the cars had been all-steel and of the subway type. There would have been no fire, anyway, and that was the crowning horror of the night disaster near Pittsburg. The heavy damages to the injured and the losses of property and prestige coming from such accidents ought to commend the decision of the subway officials on the steel car to the serious consideration of the steam roads.

Lord Kelvin has undergone a serious operation in the past week and his condition at latest reports was not encouraging. His advanced age, 80 years, is a handicap. It has been intimated recently that he would be the recipient of the first John Fritz medal. This is awarded by a joint committee of the four national engineering societies in this country to the man most representative of engineering and eminent in scientific advance.

The Labor Situation.

STEEL CORPORATION'S ADVANCE IN WAGES.

On April 1 the wages of practically all of the men employed in the iron and steel plants of the subsidiary companies of the United States Steel Corporation were advanced and only in those departments in which high wages have been maintained was no advance made. Nothing specific regarding the advance has yet been given out, and no official announcement will be made showing to what extent the advance has affected the various classes of labor. In the sheet and tin mills, where the wage scale of the Amalgamated Association prevails, no advance has been made, nor has there been an advance among the skilled labor in the mills which are operated non-union. The advance, however, averages from 5 to 7½ percent and in some instances is greater. W. E. Corey, president of the Steel Corporation, has given out the following statement regarding the advance:

"A few departments in which wages have been maintained at a high level will not be affected, but the advance will be fairly general in all the plants of the corporation. I cannot go into the details before the formal announcement is made. The increase in wages, however, is warranted by the general outlook in our business."

STOVE FOUNDERS' AND MOLDERS' CONFERENCE.

A joint conference of representatives of the Stove Founders' National Defense Association and the Iron Molders' Union was held at the Auditorium Hotel in Chicago, March 28 to March 31. The S. F. N. D. A. were represented by C. H. Castle, Quincy, Ill.; Henry Cribben, Chicago; Jeremiah Dwyer, Detroit, Mich.; E. W. Peck, Rochester, N. Y.; Lazard Kahn, Hamilton, O.; D. McAfee, Quincy, Ill., and Fred Will, of Rochester, N. Y. The Molders' Union was represented by Jos. Valentine, Cincinnat,; M. Keough, Troy, N. Y.; Jos. Rohlman, Columbia, Pa.; Chas. Holt, Quincy, Ill.; Chas. T. Nevins, Taunton, Mass., and LaVerne Peterson, Detroit, Mich. Mr. Valentine acted as chairman and Mr. Thos. J. Hogan secretary of the S. F. N. D. A., was secretary of the meeting. The most important action taken was the passage of a resolution by the joint conference making the ratio of apprentics one to five The old wage scale was reaffirmed. A resolution was also adopted changing the method of paying "cat skinners" from a day wage to a percentage basis equal to 15 percent above the wages earned under regular conditions.

LABOR NOTES.

About 500 members of the Structural Iron Workers' Union in Cincinnati have gone out on a strike for higher wages and an eight-hour day. Work on many new buildings has been stopped.

Governor Hanly, of Indiana, served notice last Friday that rioting at the Inland Steel Co.'s plant at Indiana Harbor would not be tolerated, and that if any outbreaks occurred he would send a militia to protect the property. No serious rioting has occurred and the entire plant is now running in fair shape.

The action of the United States Steel Corporation in advancing the wages of its employes will be followed by other steel and iron companies. Notices of voluntary advances by a number of the independent companies are expected to be posted next week. The Lehigh valley furnace companies have already announced a general advance of 10 percent, while the Buffalo furnaces have restored the reduction made last year.

While no formal demand has yet been made, it is probable that the wages of the members of the Blast Furnace Workers and Smelters' Union of America, employed at furnaces in the Mahoning and Shenango Valleys, will be advanced on May 1.

In accordance with a notice posted at the different plants of the Thomas Iron Co., of Easton, Pa., several weeks ago, an advance of 10 percent in the wages of employes was made April 1. The advance is in force at the Hokendauqua, Alburtis, Hellertown and Island Park furnaces, as well as at the Richard mine and other outlying operations.

Obituary.

Thomas H. Wickes, who had been vice president of the Pullman Co. since 1896, and known as one of the ablest assistants of George M. Pullman in the direction of his great car building industry, succumbed to an acute attack of heart disease March 28. Mr. Wickes entered the employ of the Pullman Co. in 1868 as an assistant to an agent in East St. Louis. He advanced steadily with the company until 1886, when he was made general superintendent of the Western division. He was promoted in 1889 to the office of general superintendent, and soon after was made second vice president. In 1896 he became vice president, which position he held up to the time of his death.

Capt. Alexander Marshall, purchasing agent for the Standard Oil Co. at Chicago, died Sunday, April 2, at the Augustana hospital.

James Madison Seymour, who was mayor of Newark, N. J., three terms, Democratic candidate for governor of the state in 1901 and a mechanical engineer of wide reputation, died at his home in Newark, April 1. He was 69 years old. In 1862, when the Sharps Rifle Mfg. Co., of Hartford, Conn., received a contract for gun machinery for the Spanish armory at Oveido, Spain, Mr. Seymour was selected to superintend its construction. On returning to New Jersey he was made general superintendent of the New Jersey Arms and Ordnance Works, Trenton. The engineering firm of Seymour & Whitlock was started at Newark in 1865, and has continued in business since.

Henry Hanna, a wealthy and honored citizen of Cincinnati, died at his home March 27, aged 93 years. Mr. Hanna was a heavy stockholder in many business enterprises, including the Newport Iron & Steel Works, the Addyston Pipe Foundry and a number of banks. He was actively engaged in business until about a year ago.

Heavy Production of Sheets and Tin Plate.

In the month of March the American Sheet & Tin Plate Co., Pittsburg, broke all previous sheet and tin plate production records. The output of sheets, including black and galvanized, was approximately 50,000 tons, while that of all kinds of tin and terne plate was also approximately 50,000 tons. The output of the latter is 50 percent above the requirements under a normal demand.

The E. H. Mumford Co.

Announcement is made that E. H. Mumford and C. S. Lovell, formerly of the Tabor Mfg. Co., of Philadelphia, have formed the E. H. Mumford Co. for the manufacture of molding machines. Mr. Mumford's name has been long connected with development in this department of foundry operations and his contributions to the literature of the molding machine have been most important. The various foundrymen's associations have frequently invited his discussion of the problems which the designers of molding machinery have had presented to them as they have enlarged their sphere of operations in recent years. It is the intention of the new firm to make use of the experience of its members to develop a line of molding machines aiming at simplicity, strength and efficiency, and to employ the latest combinations and modifications, protected by new patents. The operations of the E. H. Mumford Co. will be carried on at 17th and Callowhill streets, Philadelphia.

PERSONAL.

Amos Shephard, manager of the mines of Corrigan, McKinney & Co., on the Mesabi and Gogebic ranges, while at the Kitchi Gammi Club, Duluth, March 28, fainted and fell on the tile floor, fracturing his skull at the base of the brain. Mr. Shephard was unconscious for a number of hours, but after recovering consciousness showed such improvement that his recovery is hoped for, although his condition is very serious.

J. H. Sheadle, secretary of the Cleveland-Cliffs Iron Co., Cleveland, has returned from a trip to California.

William G. Coxe has been elected president of the Harlan & Hollingsworth Shipbuilding Co., of Wilmington, Del., to succeed David C. Reid. Mr. Coxe has been connected with the William Cramp Ship & Engine Building Co. for eight years. Although a young man, he brings to his new position large experience. He was in the engineering department of the Cramp company and acted as its agent for the delivery of ships to Russia, Turkey, Japan and China. He is a graduate of the University of Berlin and gained experience in ship yards in England and Scotland before coming to Cramps.

W. H. Pfahler has resigned the treasurership of the Abram Cox Stove Co., Philadelphia, and hereafter will devote his time principally to the Model Heating Co., of that city, of which he is president. Mr. Pfahler will continue as a director of the Abram Cox Stove Co.

Geo. B. Damon, who has been manager of the Wellman-Seaver-Morgan Co.'s New York office, has been transferred to an important position in connection with the engineering and sales department at Cleveland, and W. A. Stadelman, for the past ten years manager of the Eastern office of the Brown Hoisting Machinery Co., has become manager of the general Eastern office of the Wellman-Seaver-Morgan Co., with offices at No. 42 Broadway, New York. Mr. Stadelman is well known from his connection with the Sprague Electric & Railway Motor Co., also as chief engineer of the Equitable Electrical Railway Construction Co., general manager of the Bristol Belt Line Railway Co. and for the past ten years in his connection with the Brown company.

W. A. Roome, who has been general manager of the Scully Steel & Iron Co., Chicago, has severed his connection with that concern.

Richard Devens, for a number of years connected with the Brown Hoisting Machinery Co at the Cleveland and London offices, has been in charge of the New York headquarters since the resignation of W. A. Stadelman.

Edwin R. Kent, president of Edwin R. Kent & Co., 8 South Canal street, Chicago, tool steel manufacturers and distributers, will sail from New York on April 29 on the steamer Etruria for a vacation of indefinite length in Europe. Mr. Kent is convalescing from a long and serious illness, and will remain abroad until he has fully recovered his health.

N. D. Carpenter, Detroit sales manager of the Carnegie Steel Co., has been spending some weeks on the Pacific Coast and will return the latter part of April.

John S. Oursler, manager of the Shenango steel works of the Carnegie Steel Co., New Castle, Pa., has been appointed manager of all the New Castle plants of the Carnegie Steel Co., while William H. Lewis, manager of the South Sharon steel plant of the same company, has been appointed general manager of all the Carnegie works in the Sharon district.

Samuel Jackson, assistant master mechanic of the Union works of the Carnegie Steel Co., Youngstown, O., has resigned to accept the position of master mechanic of the Madison, Ind., mills of the American Car & Foundry Co.

John A. McKay has been appointed general manager of the Greenville, Pa., plant of the Carnegie Steel Co.

Harry J. Davis, assistant superintendent of the Homestead works of the Carnegie Steel Co., Pittsburg, has been appointed superintendent of the Donora works of that company. He is succeeded at Homestead by John S. Unger, who has been superintendent of the armor plate department for a number of years. S. S. Wales, formerly superintendent of the electrical department at Homestead, Carrie furnaces and the Howard Axle Works, succeeds Mr. Unger. Charles A. Menk succeeds Mr. Wales and Charles F. Fritz will go to Donora as private secretary to Mr. Davis. E. O. Knight, employed at the Homestead steel works in an engineering capacity, goes to Donora as mechanical engineer. Fred Christianer, an inspector at the Homestead plant, has been appointed superintendent of the blooming mill at Donora.

Lewis B. Reed, Omaha, Neb., who, after graduating from Harvard University, two years ago, entered the employ of the American Radiator Co., Chicago, has been placed in charge of the European business of that company. He sailed on March 29, and will make his headquarters in London.

Robert A. Magley, who for a number of years was in charge of the Bessie Ferro-Silicon Iron Co., has been appointed general manager of the Bessie Ferro-Silicon Iron Co., which will operate the Bessie furnace at New Straitsville as soon as the rebuilding of the stack is completed.

C H. Haney, foreign sales manager of the International Harvester Co., left for Australia a few days ago, and will circumnavigate the globe before his return.

A farewell dinner was given at Milwaukee March 26 to E. N. Dickson, the retiring purchasing agent of the Allis-Chalmers Co. Covers were laid for forty. H. Woodland was toastmaster and numerous responses were made.

The United States District Court at Philadelphia has appointed Charles F. Walters and Thomas Hadir receivers for the Philadelphia Steel & Iron Co. in Philadelphia.

Chas. A. G. Winther, who has been general superintendent of the Chapman Valve Mfg. Co., Indian Orchard, Mass., for the past four years, has resigned to take a well earned rest. Mr. Winther had come to be known as a factory manager and organizer on modern methods, his experience being in machine shop and iron and brass foundry work. He was for nearly 15 years superintendent of the Star Brass Mfg. Co. and previously was connected for eight years with the Crosby Steam Gage & Valve Co. He has been a member for many years of the American Society of Mechanical Engineers, the National Association of Stationary Engineers and the American and the New England Foundrymen's Association.

W. P. Snyder, Pittsburg, returned last week from a two-months' stay at Palm Beach, Fla.

Peter A. Crane, assistant superintendent of the Braddock, Pa., plant of the American Steel & Wire Co., has been appointed to a similar position at the company's Rankin, Pa., plant.

S. E. Smith has resigned as chief engineer of the Donora, Pa., plant of the Carnegie Steel Co. and has been appointed chief engineer of the Passaic Steel Co., Paterson, N. J. He left Pittsburg this week to assume his duties with the Passaic Steel Co.

Harry O. Price, formerly sales agent for Joshua W. Rhodes & Co., Pittsburg, has been appointed resident manager of the Pittsburg office of Walter, Wallingford & Co., dealers in pig iron and coke, located in the Farmers' Bank building.

C. C. Conklin, civil engineer of the Lackawanna Steel Co., Buffalo, has resigned and the civil engineering department has been merged with that of Alex. K. Hamilton, chief engineer, so that the organization in the office of the chief engineer is at present: K. C. Hoxie, chief draftsman in charge of the mechanical engineering division, and C. S. Boardman, chief draftsman in charge of the civil engineering division.

J. R. Phillips, manager of the Pittsburg district mills of the American Sheet & Tin Plate Co., has resigned, and is at the head of a company that has purchased the plant of the Clarksburg Sheet & Tin Plate Co., Clarksburg, W. Va. The plant was recently sold at a receiver's sale, and it is probable that it will be removed to a location nearer Pittsburg.

The Eastern Machinery Market.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., April 4.

The machinery market in this vicinity during March was an improvement in many ways over that of the preceding month. Not only was the volume of trade larger, but a still more gratifying feature was that it covered more branches, and there was a much wider distribution of the orders. Not in some time has it been possible to note such healthy conditions as these, and the inference generally drawn is, that all the basic elements of a prosperous year are present. It is not very long since the orders booked took in a very narrow field, but during the past month this has been considerably widened. The spring-like weather has been a potent factor in the improvement that has taken place. Another reason is that the general business situation is getting better, and many projects calling for the use of machinery planned during the winter, are now being pushed to conclusion. This is particularly true of municipal enterprises which are now being projected to a greater extent than in several years, it being comparatively easy to float the necessary bonds for them. Inquiries that will lead to the purchase of machinery have been coming in in great numbers, and each day that passes seems to contribute to their increase.

Machine tool merchants note an appreciable improvement in their line over March. Some of them say they have taken more orders during the past month than they have in any since the boom which ended about two years ago. Not at any time since then have the railroads been such liberal buyers of machine tools as recently. This branch of the trade was the disappointing feature in 1903 and 1904, but it begins to look as if it would constitute the best branch this year. One machine tool merchant said that railroad specifications that are now practically ready for the trade, aggregated about $2,000,000, the Philadelphia & Reading road alone being a prospective buyer to the extent of $500,000. The most important contract given out recently was by the Lehigh Valley road, whose purchase of machines for its Sayre, Pa., plant, amounted to over $100,000, the Niles-Bement-Pond Co. getting the most of it. This road will be in the market again before long for some additional purchases. The General Electric Co. made some good purchases of machine tools also, and will greatly add to these in the near future. The Westinghouse Electric & Mfg. Co. will purchase liberally of machine tools for the addition it is building to its Newark plant. It has not been an unusual thing during the past month for many large machine tool needs to be taken care of by small purchases now and then. Ordinarily—as seen last year, for example—this practice would not be relished at all, but now-a-days manufacturers could hardly have anything more to their liking. This brings up the question of deliveries, which is becoming a more important factor with purchasers. Such a thing as prompt delivery for any kind of a machine, seems to be getting rarer every day. Store rooms that were uncomfortably crowded with stock a few months ago, now have a deserted appearance, and every week that passes finds this state of affairs becoming more pronounced. For the general run of standard machines a month is considered good delivery; but for those having special attachments of any kind the delivery extends to three or four months. In lathes and large milling machines there are some manufacturers who will not promise delivery short of four to eight months. Where a house became informed a few months or a few weeks ago of a contemplated purchase, the party is urged to place his order as soon as possible in order to insure reasonable delivery. Prices of machine tools are extremely firm. Two agents visited by the writer, and who handle standard lines, said they expected to be told any day to advance their prices. Gossip as to the propriety of an advance is being freely indulged in. A few months ago the idea would be discouraged, but in many quarters now it is looked upon with favor. The National Machine Tool Builders' Association will hold its annual meeting next week and the opinion here is that it will then formally declare for an advance of from 5 to 10 percent in prices.

In engines and boilers March was a much better month than February. In the former orders for large horse power, which for months have shown a decidedly backward tendency as regards closing, were closed a little more freely. One of the interesting contracts that were awarded recently, was by the Halcombe Steel Co., which is building a new plant at Syracuse, N. Y., and the chief promoters of which are English capitalists. The company gave out contracts calling for engines which aggregated about 1,500 h. p. The contracts called for three payments, the last one of which was to be made in tool steel. This last provision was not agreeable to some of the bidders, whose other terms, however, were satisfactory. The orders were divided between Philadelphia, Cincinnati and Youngstown concerns. Engine inquiries during March showed a very large increase, and builders are looking forward with confidence to booking some good business in the near future. Prices for engines are becoming a little firmer, and there is not the willingness to offer concessions that there was in the early part of the present year. In boilers there has been a steady increase in trade during the past few weeks, with the tendency to defer purchases on large units not as strong as it has been. Manufacturers assert that their inquiries are so numerous as to justify them in expecting considerable activity in their line later on.

In electrical machinery more business was booked in March than in any month in some time. This is accounted for by building operations being pushed and planned on a larger scale, with the Western sections of the country being especially prominent in this respect. Prices are hardening, but not to the extent some would wish. As for inquiries they are said to be all that could be desired. In power transmitting and woodworking machinery, March witnessed an improvement, cotton mills being especially heavy buyers of the former. The demand for machinists, engineers, contractors, and railway supplies, has shown an improving tendency recently also.

The export machinery trade was decidedly brisk during the past month, with machine tools and power requirements leading the activity. On the continents, England and Germany have been well represented in the order lists, while South and Central America have been the chief buyers on this side of the ocean.

The Niles-Bement-Pond Co. report an exceptionally good trade for March. Outside of the order noted above, the company booked several other fair contracts from railroad sources. The company finds the outlook in this direction better now than at any time in two years. Its present office and store room are now being dismantled, preparatory to removal to its new offices at No. 111 Boardway, which it expects to occupy around May 1. Secretary Davis, of the company, who has been ill for over a year, is still unable to resume his duties.

Manning, Maxwell & Moore, say their orders for March showed an increase over those of February. Its machine tool and crane departments booked some very good contracts. The company takes a most optimistic view of the outlook.

The Prentiss Tool & Supply Co. express extreme satisfaction with their March business. They found an excellent demand for all the standard machines they handle, especially for milling machines and lathes.

Hill, Clarke & Co. report a steady flow of orders, extending to all kinds of machines, with delivery forming a strong factor in current sales.

James McCabe notes a gradual improvement in his trade, and booked more orders in March than in the month preceding.

Paul Bigelow, representing the Buckeye Engine Co., closed some good contracts during the past month, the most noted being one for a 1,400 h. p. cross compound horizontal engine, for Westinghouse, Church, Kerr & Co., New Haven Conn.,

and another for a 250 h. p. single engine for the Consolidated Gas Co., New York City. Mr. Bigelow has several large orders practically closed, and looks for a substantial improvement in his line later on.

The local office of the Hooven, Owens & Rentschler Co., closed some good engine orders recently, the most important being one for 600 horse power for a new plant in Northern New York.

E. W. Ludeman, who handles a line of standard engines, finds trade improving. Mr. Ludeman is now at 42 Broadway, this city.

Both the Geo. V. Cresson Co. and the A. & H. Brown Co., report a gratifying improvement in the demand for power transmitting machinery during March, with cotton mills especially heavy buyers.

Thayer & Co., Inc., say the steam boiler trade is getting better. Their orders for March were unusually good. The company now occupies its new offices at 42 Broadway, this city.

The Lidgerwood Mfg. Co. say the orders for steam hoisting machinery are constantly increasing. The company's plant is compelled to do night work to keep up with its orders.

The American Woodworking Machinery Co. reports its March trade to have been the best it has done in months, and that the outlook is brighter than it has been in some time.

The Crocker-Wheeler Co. reports the demand for electrical equipment to be especially good. Its March business was the best it has done in months, and the outlook for at least several months of brisk trade is very promising.

The Ingersoll-Sergeant Drill Co. and the Rand Drill Co. say business in their line was all that could be desired during the month, with every indication that it will grow better as the year progresses.

The local office of the National Steel Foundry Co., of New Haven, notes an appreciable improvement in the foundry trade, and looks for a general advance in the price of castings in the near future.

The report that the International Steam Pump Co. is going into the gas engine business cannot be substantiated.

New List of Milled Set and Cap Screws.

At a meeting of the milled screw manufacturers held in New York on March 31, a new list was adopted which equalizes the inequalities of the former cap and set screw lists. On account of the very small quantity of square head cap screws consumed, it was found desirable to abandon the old list on this line, and hereafter square head cap screws will be sold from the list and at the prices prevailing on hexagon head cap screws. The new list, to which the principal manufacturers subscribe, does away with the variations in price between sizes which have long existed. Following the meeting the manufacturers issued their respective discount lists. For steel set and cap screws these provide for 25 percent net advance over iron.

Large Output of a Continuous Mill.

The Morgan continuous mill of the International Harvester Co. at South Chicago, Ill., consisting of a roughing train with 8-in. and 11-in. finishing stands, made a record run in the month of March when in 54 turns it produced 7,540 gross tons of finished product. This output was made in the regular course of business and covered a wide variety of sizes from 7-16-in. to 2-in. rounds and 3/8-in. to 1¼-in. in squares, with other miscellaneous sections within the same range.

The Bray continuous sheet mill installed at the Mercer works of the American Sheet & Tin Plate Co., South Sharon, Pa., is now being operated experimentally. It will be some time before any attempt is made to operate the plant in full on commercial sheets as the process has not yet reached the point where operations can be carried on to this extent.

BRITISH IRON AND STEEL OUTPUT IN 1904.

Statistics have just been published of the production of pig iron and steel in Great Britain in 1904, the figures being gathered from makers by the British Iron Trade Association. The total make of pig iron was 8,562,658 tons, against 8,811,204 tons in 1903, 8,517,693 tons in 1902, and 7,851,830 tons in 1901. The falling off from the figure for 1903 was 248,546 tons, though there was a slight increase over 1902 and a considerable increase over 1901.

The production of forge and foundry iron was 3,841,975 tons in 1904, against 3,875,826 tons in 1903; of hematite, or Bessemer, 3,362,883 tons, against 3,760,422; of basic, 1,192,120 tons, against 991,610; of spiegel and ferro, 165,680 tons, against 183,346. The falling off in Bessemer iron shows the displacement of British steel billets and sheet bars by imports from the United States and Germany. The increase of 200,000 tons in the production of basic iron, as compared with 1903, is noteworthy.

The annual make of pig iron in 1904 shows an average of 26,346 tons per furnace, the greatest average output in any district being 43,810 tons in the Cleveland district. The average of Scotland was 15,670 tons. Small as these averages appear in comparison with those for the United States, where 150,000 tons a year has been attained by the largest furnaces, they represent a distinct gain, since the blast furnace practice of Great Britain has greatly improved in recent years.

Bessemer and Open-Hearth Steel.

Bessemer steel ingot production in the United Kingdom in 1904 was 1,781,533 tons, compared with 1,910,018 tons in 1903, 1,825,779 tons in 1902 and 1,606,253 tons in 1901. In but one year of the 15-year period, 1890-1904, has the British production of Bessemer steel exceeded 2,000,000 tons and in 10 out of the 15 years the output exceeded that of 1904. There was an increased production of Bessemer ingots in South Wales last year and in Scotland and Staffordshire. Of the total, the acid Bessemer process contributed 1,129,224 tons and the basic Bessemer 652,309 tons. In the Cleveland district the production of acid Bessemer steel, which has been declining for years, reached the low point of 10,449 tons. Its production of basic Bessemer was 304,817 tons, its phosphoric ores giving that process particular vitality. The average number of working converters in Great Britain last year was 50½ and of inoperative converters 19½. Of those in operation 21 were on basic Bessemer. In 1890 there were 82½ converters in operation, which produced 2,014,843 tons of ingots, or an average output per converter of 24,422 tons. In 1904 the fifty converters in operation produced a total of 1,781,533 tons of ingots, or 35,630 tons per converter.

The British output of open-hearth steel in 1904 was larger than in any previous year excepting 1901. The total was 3,245,346 tons, compared with 3,124,083 tons in 1903, 3,083,288 tons in 1902 and 3,290,791 tons in 1901. In 1890 the British output of open-hearth steel was 1,564,200 tons, so that it has a little more than doubled in 14 years. In the United States a three-year period has sufficed for the doubling of our open-hearth steel output. For example, in 1900 the total was 3,398,135 tons, against 1,608,671 in 1897; and in 1898 the total was 2,230,292 tons against 1,137,182 tons in 1895.

In the open-hearth steel production of 1904, 2,583,282 tons was by the acid process and 662,064 tons by the basic process. The output of basic open-hearth steel last year is the greatest on record. It represents almost twice the output of 1901 and compares with 101,287 tons in 1890. It will be noticed that the basic Bessemer and the basic open-hearth figures for 1904 are very close together—652,309 tons and 662,064 tons respectively. There was an average of 345 open-hearth furnaces in operation last year and 165 inoperative. Scotland produced 986,674 tons of acid open-hearth steel last year and 105,331 tons of basic, or a total of 1,092,005 out of the 3,245,346 tons for Great Britain. In 1904 the average output of ingots per furnace in operation in Scotland was 11,883 tons, against 6,468 tons in 1890, and in the North of England the average of 1904 was 10,040 tons, against 7,549 tons in 1890.

THE CORT MEMORIAL TABLET.

Charles Morgan, of the Morgan Construction Co., of Worcester, Mass., read a paper at the Lake Superior meeting of the American Institute of Mining Engineers at Duluth in September last. He took for consideration "The Case of Henry Cort," and presented some historical data relative to a pathetic figure among the pioneers in bar iron production. Henry Cort was born at Lancaster, Eng., in 1740, began his experiments in 1765 and set up a forge and mill at Fontley, near Farnham, in 1775. He took out a patent on a puddling process in 1784 and expended his private funds, some $100,000, in developing inventions and building plants. Further financial assistance became necessary and he innocently admitted an associate, rich with the embezzled cash of the British government. Exposure followed swift upon the sudden death of his partner and Cort went down to disaster in the crash. His papers were destroyed by fire and he was destitute of evidence or shred of security as to patent rights or royalties. He could get no redress and the licencees under the patents were relieved of all royalties due him.

He appears to have been blameless but ruined, and he failed to get more than flimsy recognition of his contribution to England's greatest industries. Pitt obtained an annuity of $800 for him in 1794, and on his death in 1800 Cort's two unmarried daughters were granted pitiful pensions of $100 each.

Mr. Morgan at the Lake Superior meeting announced that permission had been obtained to erect a suitable memorial to Henry Cort in the Hampstead parish church and a replica of this bronze tablet has been given to the parish church at Lancaster where Cort was born. The memorial plate is in the porch of the Hampstead church and the remains of the inventor rest in the adjoining graveyard. The tablet was designed by A. E. Howard, of Worcester, Mass., and was cast by the Gorham Co., of Providence, R. I.

IN MEMORY OF
HENRY CORT
BORN AT LANCASTER 1740
INTERRED AT HAMPSTEAD 1800
TO WHOM THE WORLD IS INDEBTED
FOR THE ARTS OF REFINING IRON
BY PUDDLING WITH MINERAL
COAL AND OF ROLLING METALS
IN GROOVED ROLLS.

CORT MEMORIAL TABLET IN HAMPSTEAD PARISH CHURCH.

At the unveiling ceremonies, March 9, the following were present: Sir Alexander Binnie, representing the Institution of Civil Engineers; Nicholas West, Society of Engineers; Sir H. Trueman Woods, Society of Arts; Prof. W. Gowland, Professor of Metallurgy at the Royal School of Mines; Edgar Worthington, secretary of the Institution of Mechanical Engineers; C. McDermid, secretary of the Institution of Mining and Metallurgy; Bennett H. Brough, secretary of the Iron and Steel Institute; A. S. E. Ackerman, president of the Civil and Mechanical Engineers, and J. P. Bedson, of the Iron and Steel Institute. The tablet was unveiled by J. Williams Benn, M. P., chairman of the London County Council.

Jacob Rohrbach and Charles C. Waters, of Frederick, Md., and L. B. Keene Clagett, of Baltimore, have been elected trustees of the Blue Mountain Iron & Steel Co., bankrupt. The election of trustees is expected to lead to a final winding up of the affairs of the company, which, during its existence of about five years, has been almost constantly in court.

Fifty years ago, the first iron water pipe used in Cleveland was cast by Jas. Bettice, who died a number of years ago. Postmaster Dewstoe, of Cleveland, has received a letter from Mrs. S. A. Stephenson, Winterstedt, Ia., who states that it was the wish of her father that in the spring of 1905 she should remind the people of Cleveland that 50 years before he cast the first water pipe. Bettice was a foundryman in Cleveland when iron pipes were curiosities. Mrs. Stephenson states that she tapped the metal from the cupola from which the first pipe was cast.

The Frictionless Metal Co., Richmond, Va., will remove from that city to Chattanooga, Tenn., as soon as a foundry building can be completed in the latter city. C. E. Buck, of Birmingham, is president of the company. The plant which will be erected will be 150 x 100 ft., two stories.

The Thomas Spring & Gear Co., Hornellsville, N. Y., recently incorporated, has acquired a plant at Canisteo, N. Y., where it will begin, next week, to install machinery and outfit purchased from a firm at Amsterdam, N. Y., for the manufacture of the new Thomas coil wagon springs and the putting together of wagon gears. C. Thomas, of Canistoe, one of the incorporators, is the patentee of the spring which will be manufactured by the company. The spring has been perfected during the past year, and the company will be ready to supply it to dealers within a few weeks. It has been highly endorsed by experts. The company will also manufacture a bicycle gear and other gear and body work.

Power Plant of the W. S. Tyler Co. of Cleveland.

The new power plant of the W. S. Tyler Co., of Cleveland, is an excellent specimen of modern design and equipment. It was arranged, built and has since been operated under the supervision of George S. Rider & Co., consulting engineers of Cleveland, and we are indebted to this firm for the details of its construction and equipment.

The boiler house is 56 ft. by 72 ft. and the engine room is 48 ft. by 50 ft. (An exterior view of the latter is seen in Fig. 1). The two buildings are separated by a driveway about 11 ft. wide. The engine room is 44 ft. high and the boiler room 48 ft. high under the roof girder and 72 ft. high to the peak of the monitor on the roof. Both buildings are of fireproof construction and rest on a concrete foundation 10 ft. below the floor line. This foundation varies in thickness from 12 in. to 24 in. and 36 in., according to the different loads imposed upon it.

FIG. 1.—EXTERIOR OF ENGINE ROOM.

The interior of the engine room is tastefully lined with white enameled tile and fitted with a wainscoting of pink Tennessee marble extending 7 ft. above the floor line. The floor is composed of old red Dutch tiles, and this treatment of the interior, taken from the rubber matting around the machinery, and the white enamel surface of the engines and generators, in sharp contrast with the brightly polished brass work and running gear, give a refinement to the combination that must react favorably upon all concerned. The plant is as well lighted as it is admirably designed in other equally useful directions. The whole effect is very attractive to the eye, and in practical operation the plant has been found in every way satisfactory. Figs. 2, 3 and 4 show the buildings and equipment in plan as well as longitudinal and cross sections. Fig. 5 shows the buildings during the process of erection. The power equipment in the engine room consists of a 300 k. w., 115 volt, generator coupled direct to a 28 in. x 48 in. Corliss type engine, Fig. 6, operating at a speed of 90 r. p. m., and a 500 k. w., 115-volt, generator coupled to a 22 in. and 36 in. x 42 in. vertical cross compound Corliss type engine. Fig. 7, also operating at 90 r. p. m. Both generators were built by the Crocker-Wheeler Co., of Ampere, N. J., and the engines were built by the Allis-Chalmers Co. of Milwaukee, Wis. Steam is furnished to the smaller unit at 90 lb. pressure and to the larger unit at 150 lb. pressure. Both engines run non-condensing. Each engine is furnished with its own steam line from boiler room and each is furnished at the throttle with steam separator and receiver. That for the 300 k. w. unit being supplied by the Direct Separator Co. of Syracuse, N. Y., and that for the 500 k. w. unit by the Goubert Mfg. Co., of New York.

The magnet frames of the generators are cast iron rings of patented channel section construction, divided horizontally. The two halves are accurately aligned by dowels let into the frame, and fastened together by bolts through internal flanges. The lower half of the magnet frames have feet drilled for the foundation bolts, and have leveling screws for adjusting accurately the field magnets. The poles are round and of steel cast-welded into the frame. The coils are form wound, taped and thoroughly coated with insulating moisture-proof varnish. Series and shunt coils are separate. The terminals are marked to insure proper connections. Each pole has a removable shoe, designed for good distribution of the magnetic flux and to give a comparatively large air gap between armature and field. This large air gap is a valuable feature, for no matter how great may be the care observed in erecting an engine-type generator, an unequal setting of foundations, or perhaps the ordinary wear of the journal boxes, may in time permit the armature to become slightly out of center with respect to its field. This will throw the machine out of magnetic and electrical balance. Such lack of balance causes excessive heating and sparking, bad regulation, in addition to causing a powerful attraction of the armature toward the nearest poles, straining the shaft and heating the bearings. In the Crocker-Wheeler design the air gap is so long that any slight inaccuracy in centering has but small effect on the magnetic balance of the machine.

The armature core is formed of toothed laminations of mild steel. The laminations are held to the spider by a large number of dovetail connections accurately machined. The slots have parallel slides with rounded bottoms and open tops. Ventilating surface is provided in the core and at each end flange. The windings are without joints, except where connected to commutator. The conductors are solid copper wires or strips with cotton covering, taped and varnished. In the slots are troughs of insulating material, shaped previously upon a form, and these, in addition to the insulation wrappings, furnish mechanical and electrical protection.

The cast-iron "rocker ring" is supported in guides on four brackets bolted directly to the magnet frame, and is capable of rotative movement for adjusting the position of all the brushes, this adjustment being controlled by a tangential screw and hand wheel. The brush-holders are supported on brackets bolted to the rocker ring. The brush rigging has also an individual adjustment of the brackets for each set of brush-holders.

In the boiler room, Fig. 8, are installed three B. & W. water tube boilers each having a rated capacity of 400 h. p. Fig. 9 illustrates the boilers during erection. Each boiler is fitted with chain grate mechanical stokers. The coal is fed to the stokers from coal bunkers through a travelling scale and chute. The boiler feed pumps are of the Worthington outside packed plunger pattern and are in duplicate, though each has ample capacity to supply sufficient water to run the plant at its full capacity. Before entering the boilers the feed water passes through a Goubert feed water heater where its temperature

is regularly raised to 210 degrees by means of the exhaust steam from engines. The system of steam piping is complete and is well adapted to the requirements. In addition to other safety devices, the steam line from each boiler is supplied with an automatic stop valve to cut out boilers in case of accident. These valves may also be operated by hand from the engineroom.

One of the dangers to be guarded against in a steam plant is the bursting of a pipe or a leak in a connection. This may flood the boiler room with live steam and cause injury or even death to the attendants unless the flow of steam can be cut off, and a great deal of ingenuity has been expended in providing valves which can be worked from a distance, or even close automatically in case of need.

The Foster combination valve can be closed by hand, either directly or from a distance, and will also shut off automatically. This valve is made by the Foster Engineering Co. of Newark, N. J. A brief explanation of the valve and its action will be of interest: The full boiler pressure is always maintained by

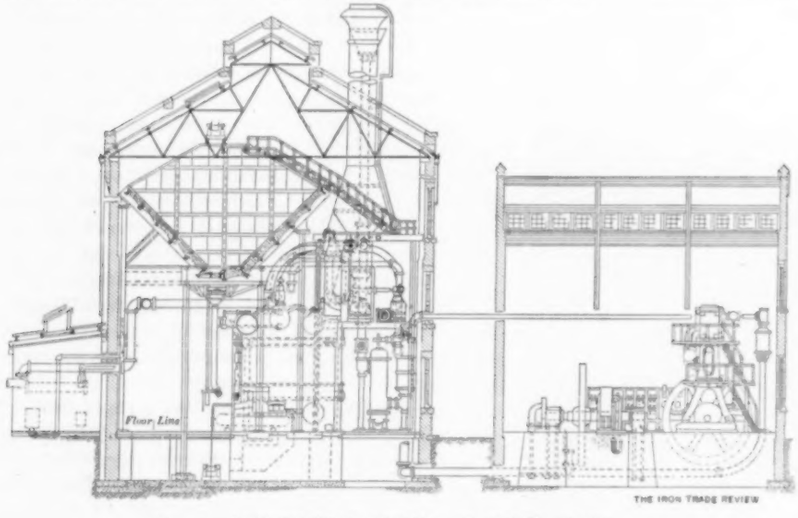


FIG. 3.—LONGITUDINAL SECTION OF POWER PLANT.

means of a pipe coming from the opening of the combination valve. The main line pressure is maintained on the diaphragm of a pilot valve, connection being made by a pipe to some distant point in the main line, where it will not cause lowering of the line pressure, should any outlet be quickly opened, and at the same time far enough from the boiler to permit of a sufficient fall of pressure to operate the pilot valve in case of breakage. A restricted nipple, fitted with a small strainer and union, is applied to this pipe a short distance from the main, and a stop valve interposed so that the nipple can be removed and the strainer cleaned. The spring of the pilot valve is set to keep it closed against a predetermined pressure, say within 50 lb. of actual or average working pressure. A sudden fall of pressure at the main relieves the pressure in the chamber of the pilot, the spring immediately closes one valve and opens another, permitting the boiler steam to pass through the pilot valve and on through the pipe into the piston chamber of the combination valve. The pressure of this steam will act against the piston, which, being of a greater area than the large valve, will instantly close the latter against its seat, and prevent the flow of steam in either direction.

The large valve remains closed until pressure is again admitted to the main. The pilot valves are then closed and opened respectively by means of a hand-wheel. The high-pressure steam in the chamber of the combination valve flows back through the pipe to the pilot, and out to the atmosphere.

The same arrangement is applicable to a plant with one or more boilers. In a battery of boilers as at the W. S. Tyler plant, the piping is connected so that one pilot valve will

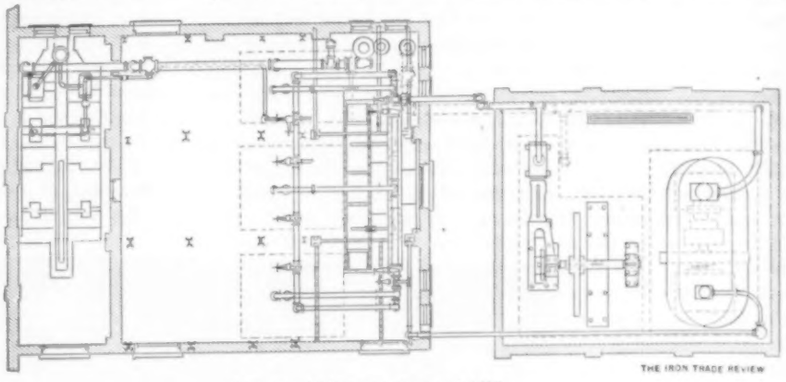


FIG. 2.—PLAN OF POWER PLANT.

operate two combination valves. Where a battery consists of a dozen or more boilers it is sometimes desirable to cut the batteries into sections, and run emergency pipes to some central point whence one or all sections can be operated instantly.

Each boiler is also fitted with an automatic boiler feed regulator. This boiler feed controller is manufactured by the C. E. Squires Co., of Cleveland, and is the outcome of several years' experiment. The leading feature of the device is in the fact that the main feed valve is controlled by direct boiler pressure. It is therefore positive in all its operations and opens to the full extent without necessarily carrying an excess pressure of more than 10 or 15 lb. for feeding purposes. This advantage is rendered possible by the introduction of the auxiliary valve which requires a movement of not more than 1-64 in. The motion of the auxiliary valve is automatically produced by the expansion and contraction of copper tubes. The illustrations, Fig. 10, show a heavy cast iron water column at X-X. The water column is connected at top and bottom with corresponding parts of the boiler, the middle part of the column X-X being placed at the height of the true water line indicated at W-W. The piping is run to the water column on the boiler

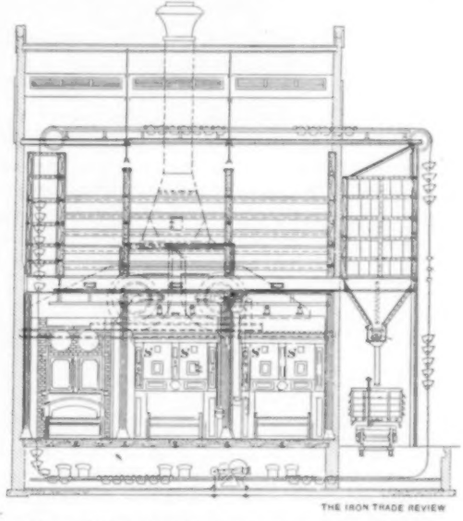


FIG. 4.—THE POWER PLANT IN CROSS SECTION.

and connected in back of the shut-off cocks, though the upper connection may be made to the dome.

The top and bottom of the column X-X are united by a series of heavy copper tubes called the harp. The extreme ends of these tubes are joined in a straight line and this connecting link contains the mechanism by which the force exerted by the expansion or contraction of the copper tubes is utilized. The mechanism in question consists of the valve B with three ports and a single seat, the valve being connected to one end of the harp by the stub F. The arrangement is best seen in the sectional view given in Fig. 10. The valve seat is connected to the other end of the harp by two rods linked together with a turnbuckle. The sectional view shows the

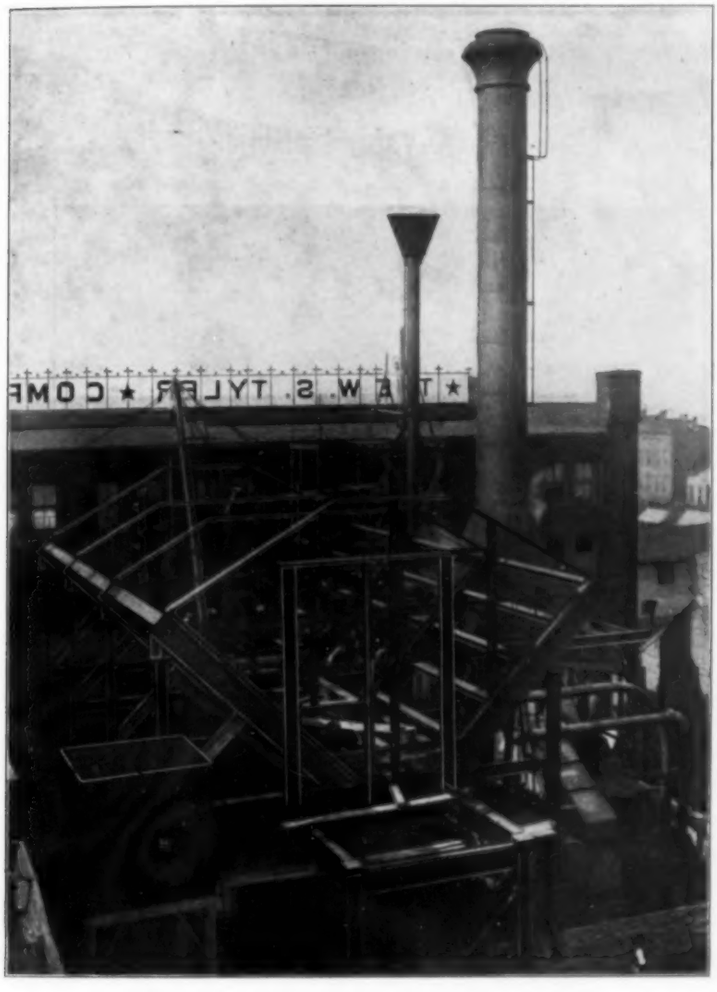


FIG. 5.—THE BUILDINGS IN PROCESS OF ERECTION.

sleeve between the valve B and the turnbuckle containing a coil spring for holding the valve to its seat against the boiler pressure on P. The port M, of the valve B, is connected by a ⅜-in. pipe I with the regulating valve A controlling the water supply from the pump. A check valve and the globe valve O are placed between the regulating valve A and the boiler as is customary.

The operation of the valve B is as follows: Steam enters from the dome or top of boiler through the port H. It is met by the plug P which is 1-64-in. less in diameter than its chamber. Through this small opening enough steam enters by way of the port M to build up promptly the full boiler pressure on top of the diaphragm and thus close the valve A. This closure shuts off the water supply completely. Evaporation continues in the boiler and the water line falls. Steam fills a larger proportion of the copper harp than before and the left hand end, as in Fig. 10, expands still further. This expansion exerts a pull, unseating the valve B and opening the lower part leading to the air. Pressure on the diaphragm is at once relieved, exhausting through S, and the valve A is opened by the spring. Communication with the pump being established, the water line falls. Then the harp cools and contracts, the valve B closes and the exhaust through S ceases. The steam seeping past the plug again builds up boiler pressure and thereby closes the regulating valve, cutting off the water supply.

The pipe Q is of brass and located at least 18 inches above any possible surge of the water line in order to give dry steam to the auxiliary valve. The blow-off cocks E and R are employed at starting the controller and insure a supply of dry steam to the harp and regulating valve.

For the sake of clearness the controller action has been described as if it were intermittent. It is found in practice, however, that both the valves A and B remain open and there is a steady feed accompanied by a continuous slight exhaust through S.

With a uniform load the stroke of the pump is absolutely regular and demonstrates that the feed water is supplied in exact proportion to the rate of evaporation.

The system of induced draft devised by the B. F. Sturtevant Co., of Boston, Mass., is used at this plant. This is installed in duplicate, each fan having capacity to operate the entire boiler plant. It is automatic in its regulation and has proven very satisfactory in its operation and results. These fans are seen in Fig. 11, a reproduction of a photograph taken during erection of the apparatus. These are two fans with direct connected engines; each engine being fitted with regulating valve, and each fan being fitted with damper so that one or both may be operated at the same time.

The induced draft apparatus is located at the rear and above the boilers, the gases being collected in the breeching, which also has an outlet to the stack placed directly over the outlets of the fans. This opening from the breeching into the stack is controlled by a damper, as are also the two openings from the breeching into the fans. Thus, by closing the dampers at the fan inlets, the gases may be made to pass directly into the stack or *vice versa*. By closing the damper between the breeching and the stack and opening the dampers in one or both fans, the mechanical draft apparatus is put into service.

The size of the fans is such that each fan, when operating at its normal speed, will handle 75 percent of the full load plus 25 percent overload. In other words, each fan running at normal speed will handle about 92 percent of the rated load; the idea being, under normal conditions, to run one fan and to start the second fan only when a peak load is thrown on.

The fan wheels are 8 ft. in diameter by 45¾ in. wide at the inlet and 39 in. wide at the tips, and when operated at a speed of 207 r. p. m. have a theoretical delivery of 45,000 cu. ft. of air per minute. The fan housings are of the three-fourth housed type with steel plate bottom pans. The sheets are of 3-16 in. thickness throughout and are thoroughly stiffened with angle irons. The fans are arranged back to back and each is fitted with an independent engine.

The engines are of the horizontal side crank type, having cylinders 7 in. in diameter by 10½ in. stroke with heavy cast iron subbase, and are placed at some distance from the side

of the fan housing in order that the fan wheels may be overhung on the ends of the engine shafts. The bearings next to the fan housing and carried by them, are water cooled and the shaft is of sufficiently large diameter to overcome any possible heating.

Two regulating valves are installed to control the operation of the mechanical draft apparatus. These valves were manufactured by the G. M. Davis Regulator Co., of Chicago, and each is so arranged that with a slight decrease of pressure on the boilers more steam is allowed to go through the valve to the engine, thus increasing its speed. The speed of the engine being increased, the draft on the fires becomes greater, thus causing the boilers to produce steam more rapidly. With valves of this sort, and when carefully regulated, it is claimed that the steam pressure will not vary more than two pounds.

A spur track from the Cleveland & Pittsburg Railroad runs alongside of the boiler house and a bucket type of coal conveyor passes under the track and conveys the coal through the basement of the boiler house, Fig. 12, and up to the coal bunkers above, as in Fig 13. The coal bunkers are of V

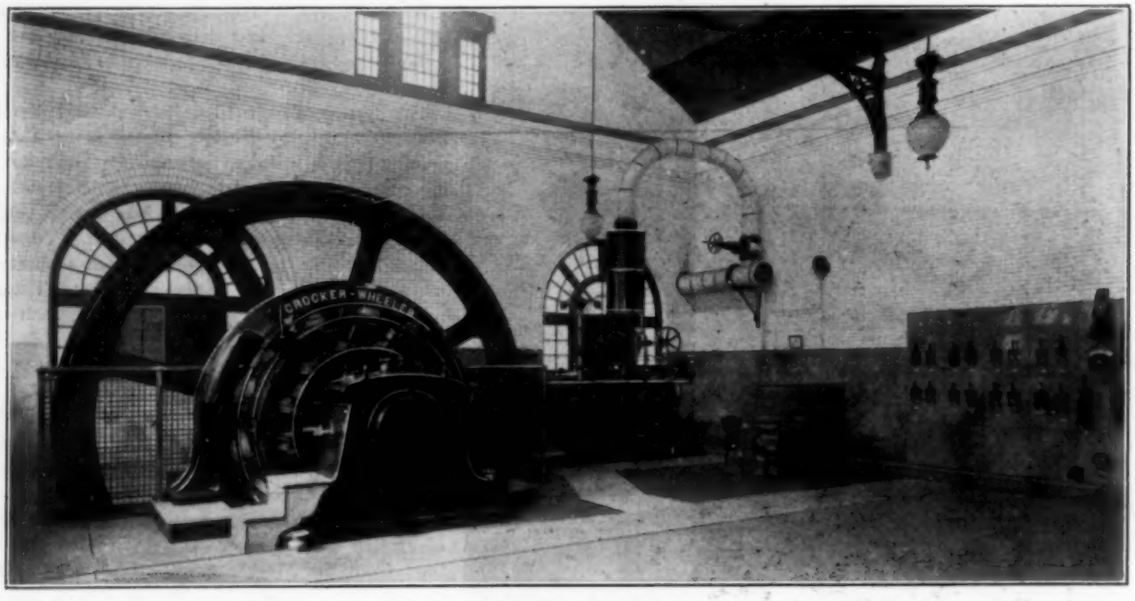


FIG. 6.—THE 28 x 48-IN. CORLISS ENGINE AND 300-K. W. GENERATOR.

section and are of steel and concrete construction and have a capacity of about 1,000 tons. The wearing surface of the pockets is composed of a granolithic lining 6 in. thick. Fig. 5, illustrates the steel work of bunkers and buildings.

The same conveyor that is used for the coal is also used for conveying the ashes from basement of boiler room up to an ash hopper located above the railroad track. This hopper is also of steel and concrete construction and has a capacity of about two carloads. By means of the conveyor system which was furnished by the C. W. Hunt Co., both the coal and ashes are handled very expeditiously and as it is now arranged all of this work is handled under cover.

The heating of the extensive system of buildings comprising the manufacturing plant is accomplished by use of the exhaust steam from the power plant. The Webster vacuum system is used in connection with the heating plant and the heating of all the buildings is at all times satisfactory, while at no time is there any perceptible back pressure produced on the engines.

Compressed air at a pressure of 90 lb. is largely used about the plant for various purposes and this is provided by a cross compound air compressor having a capacity of 1,000 cu. ft. of free air per minute, at a speed of 75 revolutions per minute. This machine was built by the Allis-Chalmers Co. and is located in a room by itself just south of the boiler house

Not the least commendable part of the installation is a handsomely appointed bath room. This is equipped with shower bath and all the desirable features in modern lavatory fixtures for the exclusive use of the engineers and firemen. This part of the installation has been quite recently installed at a considerable expense to the W. S. Tyler Co.

Finally there has been organized a large paper company to take power from the Lake Superior Corporation's canal at the Sault. This was a plan of F. H. Clergue, before the disastrous failure of the original company, and the ultimate success of the organization is due to the same remarkable man. The new company is to be called the St. Marys Fall Paper Co., its capital is $100,000 and its incorporators are: B. J. Clergue and J. H. Moore, of the Sault, and Chas. Moore, of the Union Trust Co., of Detroit. The company will take power from the American canal, which is to be overhauled and rebuilt at once, at considerable cost. Pulp will come, of course, from the mills of the Lake Superior Corporation. The corporation is increasing its rail mill capacity by the addition of some units of machinery, and is very busy with rail orders for the Canadian Pacific railroad and others. The Canadian duty is acting as a very efficient bar to the importation of any more American rails. Both blast furnaces at the Sault are now in operation, the smaller turning out something over 100 tons daily of charcoal iron.

It was announced March 27 that the Canadian Government had decided to grant a bounty of $6 per ton to encourage steel shipbuilding in the dominion. The information was given to members of a delegation from the Halifax board of trade who went to Ottawa to urge upon the Government the adoption of such a policy. The city of Halifax and other municipal authorities some time ago offered a joint cash subsidy of $300,000 to any company that would establish a steel shipbuilding plant at Halifax. The government tonnage bounty is regarded as a further step in the same direction. The bounty is applicable to the whole of Canada and its adoption was supported by delegates from Canadian rate ports, British Columbia and Nova Scotia.

MACHINE SHOP MANAGEMENT.

BY OSCAR E. PERRIGO.

The purpose of this article is to point out the methods for ascertaining and apportioning the fixed charges, office and salary, as well as the miscellaneous expenses, including those for interest and depreciation of machines and allowances for idle machines, all usually comprised under the general head of "burden." A prominent writer on the management of machine shop plants as commercial enterprises, once wrote, "upon the ability of the proper official to make correct estimates, depends to a very large extent, the commercial success of all manufacturing enterprises," and in this aphorism he embodied much truth. Admitting the truth and importance of his statement, we are nevertheless forced to the conclusion that were he to write of machine shop management in these times of sharp competition and close calculations he would also give a prominent place to the system of cost keeping and its numerous ramifications, pervading as they do every kind and class of material, from the time it enters the building up to shipment.

The urgent desire for information is well illustrated by the editor of a mechanical journal, who says, "there is no inquiry which comes to this office more often than the request for sources of information on machine shop cost keeping." And he might have added that in this search for information there could hardly be a question upon which there would be a greater diversity of opinion. The reason for this is not far to seek since the science of correct cost keeping (if we may so dignify it), is as yet but imperfectly understood and the ever varying conditions where it must be attempted render the application of any large number of fixed rules impracticable.

It has been often said that there are many ways of accounting for the time spent on the different jobs in the shop, and for dividing the so-called productive from the non-productive expense in this direction, but there is a still greater diversity of opinion and practice in accounting for the burden of fixed and miscellaneous expenses, as well as for properly ascertaining them. When they are all considered and brought out in all their diversified aspects and in proper relation to each other the result may surprise many good accountants as well as business men and proprietors who have used the old methods of assessing a certain percentage of the cost of material and labor as the proper burden which they should bear in calculating the actual cost of the product. This being a level percentage (though jobs may be in large variety and done at a bench, or on a power-driven thousand dollar machine), is usually in error, sometimes too great, but often too small, and the result, even if the entire establishment pays a profit still leaves uncertainty as to its source, since there are parts of the work done more economically than others, and some departments which should properly be credited with producing more profit owing to the better local management. In this case the head of a department who manages his working force and his equipment with the greater skill and forethought has to assume a part of the burden that another foreman partly avoids. When the cost of individual parts, or separate operations upon them is not known we lose sight of opportunities for improving upon manufacturing methods.

Many realize the practical advantages that might accrue from a thorough knowledge of manufacturing costs but have an idea that the expense would be greater than the benefit. It is, however, practicable to ascertain with considerable accuracy just what portion of the product has been manufactured at a loss and what portion was sold at a sufficient profit, as well as to ascertain what departments of the shop are the more efficient, in order that the proper investigation and remedy may be applied to those which are not up to the proper standard.

To show the gerat diversity of opinions and practices in the matter of ascertaining and apportioning the burden of fixed and miscellaneous charges in different shops at the present time the following instances are given as stated by the manufacturers or the accountants themselves. They show the view of the several gentlemen and the various methods used under the varying conditions of manufacturing, as well as the variety of the product.

FIG. 7.—THE 22 X 36 X 42-IN. ENGINE WITH 500-K. W. GENERATOR.

In one manufactory the man who has charge of the cost-keeping says that a great deal of good judgment is necessary in distributing the fixed charges and the cost of nonproductive labor, but thinks that if all money paid out for these expenses is charged to *some* account all will be well. It is true that a good deal of good judgment is necessary, in fact in the best and most exact system for ascertaining and apportioning the multitude of expense items we may find problems solvable by no common rule. These must of necessity be decided by the highest rule of all, the rule of judgment, founded upon practice and experience. It is not enough to say that we may simply charge the large variety of expenses to *some* account and then expect any reasonable degree of accuracy in ascertaining detailed costs, for the reason, as before stated, that we shall overcharge some articles of the product while others do not bear fair share of the normal burden of expense.

Another manufacturer says that the expense of the entire superintendent's department, including foremen, plumbers, electricians, watchmen, the drawing room, general repair department, pattern shop, etc., should be considered as nonproductive, while the next manufacturer says, "in our factory we do not recognize that there is any such thing as nonproductive costs. *All* factory costs with us are productive costs, because they enter into the costs of goods produced." Here is wide divergence of opinion and practice.

Again, a manufacturer has this method. He has a fixed price per hour for each machine and the man who runs it. This charge added to the cost of material is the "flat cost," to which is added a percentage of fixed and nonproductive costs as ascertained month by month, or once in three months. This plan comes nearer being correct, provided the proper method is used to determine the amount charged on account of the machine. At present it is sufficient to call attention to the fact that the correct valuation of the machines, the floor space occupied, power required and what we shall do with the cost of those that are occasionally, or frequently idle, as they occupy the floor space, which must be kept clean with the machine, and this costs, excepting power and lubrication, as much as if the machine were performing profitable operations.

Still another manufacturer gets at his nonproductive costs by aggregating all expenses except those for labor and material, for the previous six months, and ascertaining the percentage which this amount bears to the combined labor and material costs. The resulting percentage is used for the next six months and so on. The fixed percentage can be added to each class of goods manufactured, or to individual machines, or even to machine parts. It would not be accurate if any one important item had fluctuated considerably in price, as is frequently the case, for the reason that an extra high price paid for a leading material, as pig iron for instance, in cases where large quantities of castings are used, would burden the job with more of the nonproductive costs than it ought to bear, and correspondingly reduce those burdens on other jobs which required proportionately small quantities of iron castings. It is therefore evident that this plan is open to very serious objections.

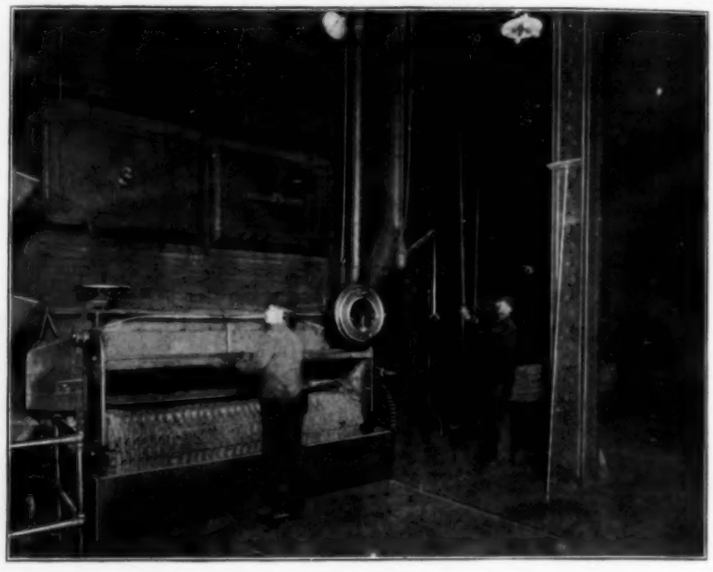


FIG. 8.—THE BATTERY OF BOILERS.

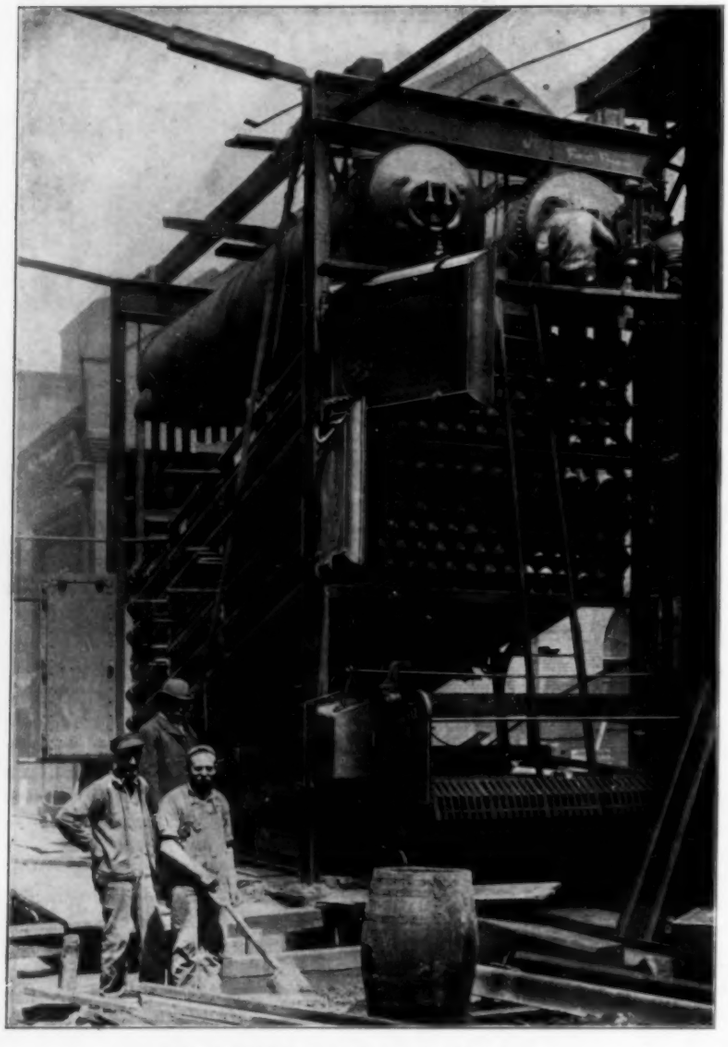


FIG. 9.—ERECTING ONE OF THE BOILERS.

Another manufacturer divides what he calls "miscellaneous charges," not including interest, rent, insurance, etc., into no less than fifty-seven accounts, one of which contains seventy-five subheads or classes. This would seem like an unnecessary number of accounts and a plan by which the practical information to be gained would hardly be worth the care and cost. While these various items enter into the calculations of non-productive miscellaneous costs and it may be useful to know the cost of the different classes of material and supplies purchased at different periods, or supplied to the various departments, for purposes of comparison, these considerations need not necessarily become a part of the cost system, by which we understand the actual expenses of all kinds properly chargeable to the production of the goods when ready for the market.

The next manufacturer, perceiving the point that the value and usefulness of the machines and their cost as to floor space occupied, power required to drive them, and their maintenance are proper factors in the problem of accounting for costs, proposes that in calculating a percentage of depreciation on the value of a machine, "the life of each machine should be learned as nearly as possible and the percentage of that life which would be used in making a given number of articles should be charged against such given number," etc., a sort of

"life expectancy" as the life insurance man would say, but what cost clerk would want to serve as "actuary" in an establishment where there are several hundred machines and as many different kinds of parts or articles to estimate upon. We must not forget that some such plan would be valuable in considering large and expensive machines which are not in continuous use, and are often idle for days and perhaps weeks. In such cases the interest charge is relatively high and the depreciation charge relatively low compared with less expensive machines in practically continuous use. These considerations add to this a many-sided problem and render it more perplexing as we endeavor to give the varied factors proper attention and weight.

In accounting for the actual costs of the product, and fixing upon an adequate plan we are confronted principally with the problem of accounting for the burden of fixed charges, non-productive labor and miscellaneous expenses. While the cost clerk must be a good bookkeeper, with a clear insight into all the clerical phases of the problems involved and an ability to prepare correct records of the business transacted, he must also often reason as a mechanic with a certain array of facts, in order to deduce from them conclusions of value to the degree of efficiency the shop has attained in the manufacture of a machine part and its efficient routine through the works. These conditions will be puzzling to a man who is simply a commercial accountant. We should hardly expect that a bank accountant would be much of a success in handling the cost system of a manufacturing establishment.

We may easily ascertain the sum total of all fixed charges and miscellaneous expenses and so divide this sum as to have "all moneys paid out, (except for material and labor) charged against something," but this method could hardly be dignified as a cost system. To properly divide and apportion these costs is the correct aim and sphere of a cost system if it is to be a valuable aid in understanding the details of manufacturing and increasing the efficiency of equipment and employees. Two general plans are frequently used for this purpose and their variations adapted to suit individual conditions. In the first of these the method charges to each job a percentage of the total burden of fixed and of miscellaneous expenses in proportion to the number of hours of direct labor. This is found by dividing the total burden of expenses by the total number of hours worked for a given period, say three or six months, or a year, thus obtaining an hour rate which may be added to the cost of labor and material to make up the actual cost of the job. This plan is defective, as it places all classes of labor, skilled or unskilled, and whether working with a few hand tools, or with an expensive machine, on a level. By this method a job done largely on machines would not bear its fair share, while the job done at a bench, by hand, will bear excessive burden. Such a plan could only be of any reasonable degree of accuracy where the employes were on a near equality as to wages and the work done on machines of nearly equal cost, floor space and power. These conditions will seldom be met, hardly ever over an entire factory and we might say never in a machine shop.

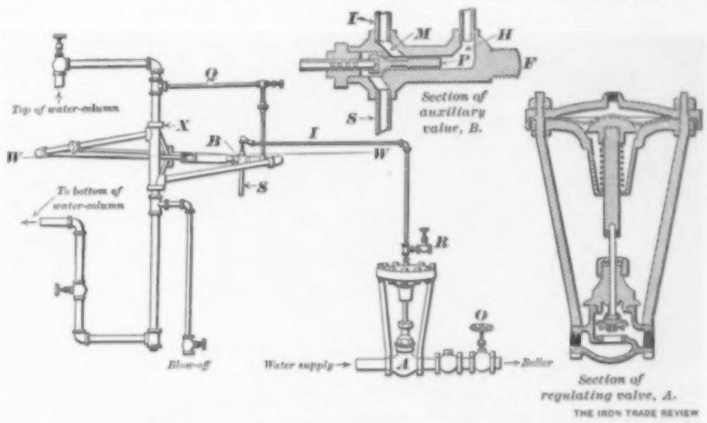


FIG. 10.—THE FEED-WATER CONTROLLER.

The second plan apportions the expense burden on a basis of the direct labor cost for each job. In this case the total burden is divided by the total amount paid for direct labor for a given period (as before) and using this quotient as a percentage of burden, is to be added to the cost of direct labor and material on each job. The fallacy of this plan is that it takes no account of the very important factor of time. For instance, if a low priced man occupies twice the time in doing a job on a certain machine as a man getting twice the pay, it naturally follows that while the cost of labor has been the same, the cheap man has occupied the machine twice as long and yet the burden charged against the machine has been the same. This is manifestly wrong, and might easily make a great deal of difference in the correctness of the outcome, particularly in a shop where there is a great diversity in the cost of the machines, and, in fact, render the system useless so far as giving accurate results or even uniform results.

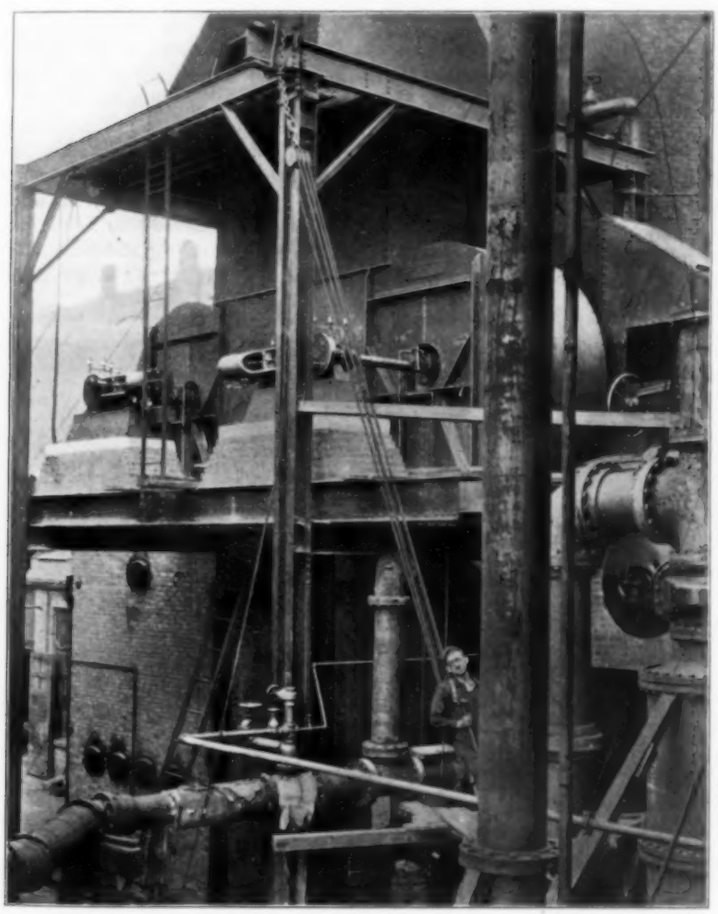


FIG. 11.—ERECTING THE INDUCED DRAFT APPARATUS.

While the time, or hourly plan corrects some of the defects of the plan of percentage of burden to the cost of labor plan, it brings in quite as erroneous ones of its own. It takes no cognizance of the value of the machines used, whether they cost a hundred dollars or a thousand, and a speed lathe might be assessed with just as much burden as a 72-inch planer. Again, a boy earning six dollars a week would count for as much by this plan as a machinist getting three dollars a day,

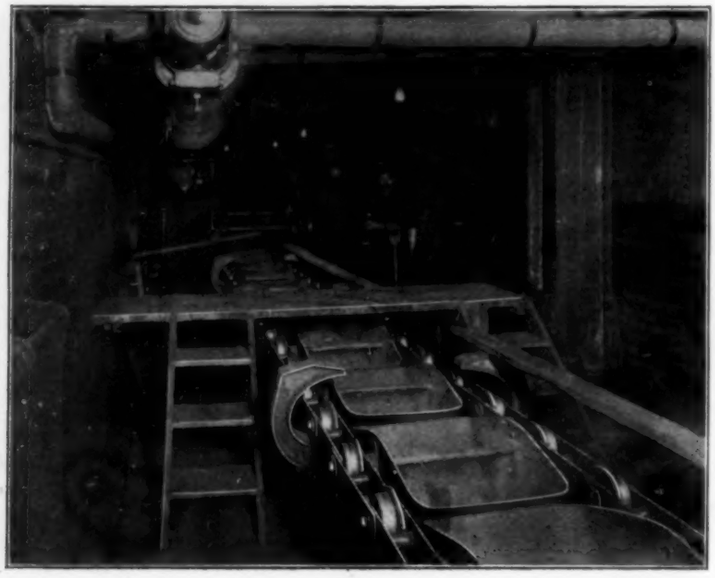


FIG. 11.—THE CONVEYOR UNDER BOILER ROOM.

so far as the expense burden is concerned. This plan would work many glaring errors, particularly in a manufactory with a large variety of machines and where the work ranges from comparatively small to quite large and heavy parts. In manufacturing establishments where the work is quite uniform and the machines upon which it is done are nearly of the same first cost, and where the wages of the operatives do not vary to any considerable extent, either of the above plans may answer all reasonable purposes. But where these conditions do not prevail we must look for some plan better suited to the prevailing conditions, and one that, while necessarily more intricate and expensive to administer, will tell with a reasonable degree of accuracy the costs of our products of whatever class, weight, or material, and enable us to know when and where losses and profits occur and what class of product, what department, or what individuals are responsible for the one or the other.

"By "fixed charges" will be understood interest on the cost of land, buildings and fixtures, insurance, taxes, water rates, etc. By "expense burden" will be meant the cost of so-called non-productive labor, the cost of power, lighting, heating and ventilating, cleaning shop, interest on cost, and the depreciation of value of machines, etc. By "supplemental expenses" will be meant the burden charge on idle machines, etc. "By "general burden" will be understood the sum of all three of the above charges.

Each machine forming a part of the equipment of the manufacturing plant should bear a portion of the general burden according to its first cost, and annual depreciation, and incidentally an additional portion due to the fact that some of the machines are sometimes idle, therefore earning nothing. Each employe not working at a machine should have a due portion of floor space burden charged in addition to his wages. Since the only source of revenue is that derived from the manufactured product sold, it follows that all expenses of whatever kind must be borne as a burden upon the manufacture of these products for the market. The entire volume of work in the shops is made up of a succession of jobs, each of which has a distinguishing number. They may, however, be classified as product, improvements, repairs, tool making, experimental, and so on.

We may properly commence with the first expenses incurred, the cost of the land upon which the buildings are erected. Then the cost of the buildings. Then the cost of the power, lighting, heating and ventilating plants, and the plant for the transmission of power, including shafting, belting, electric wiring, dynamos, motors, lamps, and all fixed accessories. In this list of costs are all partitions, railings, shelving, bins, racks, benches, fixed desks, shop railway tracks and cars, office fixtures and furniture, shop telephones, and all similar appliances not directly connected with the machines. We will add these costs together and ascertain the interest upon the amount per year. To this amount we will add insurance on buildings, fixtures, etc., taxes, water rates, depreciation and maintenance of buildings, cost of furnishing power, light, heat and ventilation, per year. To this add also the salary of superintendent, assistant, office force, foremen, watchmen, errand boys, etc., and office maintenance. This will cover our fixed charges plus the expense burden, which is to be divided by the area of floor surface in square feet, giving the burden which every square foot must bear whether occupied by a machine, a work bench, or as an erecting floor or other use. This expense must be gotten out of the sale of product in such a manner as to bear in equal proportion on all jobs in considering carefully the difference of the value of the use of the equipment involved in each of them individually.

Having ascertained the burden due to cost of buildings, power, lighting, heating, ventilating and maintenance, together with the wages of so-called nonproducers, so far as these will be constant, or very nearly so from year to year, we next consider the question of the burden due to the expense of equipment of machines required for the work contemplated. It has been pointed out that by one of the plans

FIG. 13.—A VIEW OF CONVEYOR ABOVE THE COAL BUNKERS.

discussed the difference in time was disregarded, and in another the difference in wages, while in both the difference in the cost of the machines upon which the work was done was lost sight of entirely. In this present plan the method of properly accounting for this burden will be explained. To ascertain the expense burden of a machine we first consider its cost, then its annual depreciation, the insurance upon its value, and the expense to house and drive it. It is customary to fix ten percent on the first cost of a new machine for interest and depreciation. For the next year we subtract five percent from the original cost and use this result in fixing the next valuation. To this amount we add the expense burden of so much per square foot of floor space occupied by it and its operator, as found by the expense burden percentage previously explained. While it will not be convenient to go over all the machines each year and assess them separately as to their cost, neither will it be necessary as they may be divided into groups or classes on the following plan. Those costing $500 or less; those from $500 to $1,000; then by even thousands upwards. Every machine should be numbered and its special rate recorded in a book kept by the cost clerk, giving its changed rate each year. The employee using a machine will note on his job time card, in a space provided for that purpose, the number of the machine, for the information of the cost clerk who may thus assess the proper expense burden on the job.

There is one more element or factor of burden. This is the hourly burden of idle machines, or the supplemental expense, and is disposed of in this manner. By having on the job time cards the numbers of the machines in actual use, and having the numbers of *all* machines in the shop, he readily knows what machines are not in use. An account of the machine rates thus incurred is kept during the month and distributed pro rata over the jobs during the succeeding month. While this is not strictly correct in theory it will be found equitable in practice and is much more easily accomplished than an attempt to follow up each job in the department containing the idle machines and distribute this burden among them before the account on each was closed. There is an important point gained by this account of the machines idle, in the whole shop, and in the different departments. It tells a very graphic story of the management of the department in keeping all the machines at work and the opportunity for placing them in other departments where they will be more constantly employed, or disposing of them altogether. It should be very distinctly kept in mind that every idle machine means lost money. One of the expensive drawbacks of the older practice of building an entire machine in one department, and another machine of different type or size in another department, rather than to so divide the work as to have the department equipped with machines of one type (as planers) and the next with another type (as lathes) and so on, is that while one department will be crowded with one class of work, say planer work, the next one will have their planers idle and the lathes will be crowded. The writer remembers one shop arranged after these ancient ideas in which, by actual count, nearly two-thirds of all the machines of the plant were idle at a time, and largely owing to the above causes, thereby throwing on each machine in use the expense burden belonging to *three* machines. This meant that the shop in general was equipped with about three times the number of machines necessary to do the required work by a modern organization plan, and therefore lost that much money unnecessarily.

By our plan all the machines of a class or type are located in one department, and the departments so arranged that in the natural succession of operations the work passes from the first department to the adjoining one whenever possible, and so continues till completed. Thus we get the maximum of continuous service from the smallest number of machines and have very few idle ones, consequently the minimum burden of this character.

By our plan of accounting for the cost of a given job we find it made up of five separate factors or charges, brought together by the cost clerk. These are; first, the cost of direct labor; second, the cost of material; third, the fixed charges; fourth, the expense burden on the machines used; and fifth, a due proportion of extra burden on account of idle machines.

The drawing room and pattern shop expenses require special notice. In the usual discussion of shop costs perhaps they have not had a fair share of attention. It often happens that both drawings and patterns are directly chargeable to certain jobs as are of special nature. In calculating these charges we go about it in the same general manner as in ascertaining the cost of jobs in the machine shop proper. That is, charging for time occupied, material used and to this is added a burden of fixed charges and an expense burden consisting of its proper proportion of the cost of nonproductive labor, lighting, heating, ventilating and cleaning, which, in the drawing room, will be assessed by the total area of floor surface occupied by this department divided by the number of men employed, to ascertain the burden rate per man, which is to be added to the time and material cost. In the pattern shop the same method is used for men whose work does not require the use of a machine. For those who work continuously at a machine the same method as employed in the machine shop will be used, the machine having a regular rating. Frequently the machines are used only for a fraction of an hour at a time, and the cost is hardly worth the time it will take to ascertain it. This charge will naturally fall into the fifth factor of cost. Again, both drawings and patterns are required for the regular output of machines or other articles manufactured. While these might in many instances relate only to a certain size or type of machine to be built, it would seem quite evident that the expense should be added to the fixed burden, for the same reason that we charge office furniture or shop fixtures, they becoming an asset of the establishment.

One of the machine shop departments about whose expense there seems to be much diversity of opinion is the tool room. It is liable to be employed on quite a variety of work, sometimes on orders for product to be sold, but more often for the making or repairing of tools, jigs and fixtures for use on the machines in the manufacturing departments of the machine shop. When at work on regular orders, or any part of them, the charge will be the same as if the work were done in the machine shop proper, the machines in use here being rated in the same manner. It is also clear that in making or grinding tools for lathe and planer work, cutters for milling and gear cutting, etc., and for making, altering or repairing jigs and fixtures, we are adding so much to the equipment and its usefulness, and the expense should be borne by the machines in the machine shop on which they are used. Therefore it would seem proper that a percentage on first cost and for depreciation should be added in with the fourth charge in calculating the cost of a job. Of course this charge should only apply to the machine shop proper and the burden not carried to the accounts of other departments outside of it. It may be noted that the handling of the tool room accounts should be done cautiously, as a careless apportioning may lead to very serious errors. The burden of idle machines in the tool room must be borne by the fifth factor in our cost account, for the reason that they are engaged either directly or indirectly in the production of the articles to be sold, the manufacture of which requires the use of the tools and appliances here made and maintained in useful condition.

Consumable tools and supplies such as files, waste, oil, etc. used on machines, drawn for use in the machine shop proper will be classed as a part of the fourth factor of cost. This will not include waste and oil issued to the power plant although the costs eventually find their way into the same group of charges.

The transportation of material or parts of machines being built, whether moved by shop railway, trucks or cranes, becomes a charge on the job. In case of the use of trucks or

the shop railway the machine rate, if we may so call it, has been considered already. In case of large traveling cranes, the crane is considered as a machine and rated accordingly. Where a man is required continually in attendance upon it his time may be charged to the fourth factor of cost. The same may be said of sweepers and such helpers as are sometimes engaged on general work not properly chargeable to any particular job. Cranes serving only one machine are considered as a part of that machine and so charged in fixing the machine rate. Electric motors by which machines are driven should properly be considered as a part of the power plant, whether they are operating individual machines or line shafts driving a number of machines.

The cost of all repairs on machines should be kept and once in six months five percent of the amount accruing during that time added to the machine rates. If the cost of repairs is comparatively slight the account may run through the entire year. If a machine is practically rebuilt a portion of the amount charged off for annual depreciation must be restored to its value.

In calculating the cost of power, lighting, heating and ventilating we must not forget that if there are some buildings somewhat isolated from the main buildings of the plant they should be assessed somewhat more per square foot of floor area on account of the added cost of conveying power, light and heat to them. These conditions should be carefully investigated and the burden put where it belongs. Unless the distance is considerable these variations of cost will not be very important, yet our cost system should show their influence.

While our cost system is primarily intended to show the actual costs of all work done, it does, if wisely administered, show us other facts equally important in the successful management of a machine shop or manufacturing plant. For instance; if the cost of a certain job is noticeably higher or lower than usual we may easily ascertain why it is so, as we may consider the five factors going to make up the actual cost of the job and find at once in which of them has been the loss or gain. It will be readily understood that a high priced man may be the more economical, as the time occupied on the job will be less and consequently the machine burden less, while the reverse will be true with cheap help. We may also see that with the work plentiful and the charge for idle machines running up, there is something wrong in the department where it occurs, and apply the needed remedy. It will show us which department is the more efficient and turns out its work the cheaper. It will show which department is the more economical in the use of consumable supplies. It will show the relative cost of machine repairs in the different departments. It will show in any of the departments where new machines are asked for, whether those already in use are profitably occupied, and if not, we may investigate the reasons for their not being used and the advisability of their removal to another department and possibly the substitution of a machine better adapted to the special needs of the work.

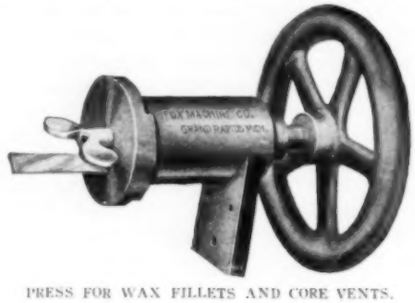
These conclusions cannot be so ascertained by any of the prevailing methods of averaging all, or even the principal part of the factors that go to make up the total cost of the work done. By the use of the fifth factor, that of a proportion of extra burden on account of idle machines, we may get a good idea of what portion of the costs may be due to the fluctuations of business prosperity or depression. It may be argued that this system is intricate and expensive to administer. In proportion to the importance of the facts brought out this is not relatively true. If we really want the information in detail and in as accurate a form as the conditions will permit we must pay for it in some way. Often in the expensive school of sad experience we may know that something is going wrong, but we cannot assure ourselves of why, when, or where the trouble is located. By this plan we know all the facts worth knowing as we go along and they cannot but be valuable aids in machine shop management. It will be noted that in this article we have not covered the matter of marketing the product, therefore the expenses of advertising and selling, as well as a proper percentage of profit must be added to the costs as ascertained by this cost system.

THE FOX FILLET PRESS.

This press is designed for conveniently running out wax fillets and wax core vents of various sizes. The press is regularly furnished with one dial for three sizes of core vents, 1-16-in., 7-64-in., and 11-64-in. diameter respectively. The machine makes fillets as follows: No. 2 fillet, ⅛-in. wide; No. 3 fillet, 3-16-in. wide; No. 4 fillet, ¼-in. wide; No. 6 fillet, ⅜-in. wide, and No. 8 fillet, ½-in. wide.

The various sizes of fillets and the core vents are obtained by turning the dial plate so as to bring the sized hole desired in front of the opening of the cylinder cap. The dial is located inside the cap casting and may be readily turned by the thumb key shown. The cap can be promptly removed when it is necessary to refill the cylinder with a supply of wax. The tool is designed for placing the supporting arm in a vise when the press is to be used.

The Fox Machine Co. of Grand Rapids, Mich., the makers of this tool, supplies extra dial plates with openings for any



PRESS FOR WAX FILLETS AND CORE VENTS.

sized fillets or core vents desired. The manufacturer intends furnishing the press with either a comparatively small wheel as illustrated or with a large wheel as the purchaser may choose. The idea is this, in cold weather the wax becomes so hard that considerable pressure is necessary. As a matter of fact however it is better to slightly warm the cylinder of the press in cold weather as the wax will then run out in better shape and in this event a small wheel is ample. When the wax is hard it has a tendency to tear along the thin edges of the fillet and the warming of the wax can be so easily accomplished by holding the press over a gas burner or lamp for a few moments that this is the preferred procedure in connection with the small wheel. As will readily be appreciated this press provides a very convenient, quick and effective device for making wax fillets and core vents and will be found serviceable in every foundry and pattern shop.

Owing to the pressure for steel the Homestead plant of the Carnegie Steel Co. was operated overtime last Saturday and Sunday, some of the mills being placed in operation four hours sooner than customary. The present month promises to be a record breaker for all the Carnegie plants, as efforts are being made to exceed all high tonnage records now standing.

It has been reported that the creditors of the South Pittsburg Iron Works, Claysville, Pa., have decided to accept a settlement on the basis of 50 cents on the dollar. The total indebtedness of the company is $102,000.

Creditors of the Barriett Electric Co., Cincinnati, have forced it into bankruptcy. The recent death of President Barriett resulted in complications which, it is hoped, will be straightened out by the receiver.

The Proposed Patent Court of Appeals—Endorsement by Manufacturers, Inventors and Patent Attorneys.

The interesting series of letters here appended suggests most strikingly the imperative need of a Court of Patent Appeals. These letters are selected from a number commenting upon a editorial on this subject which appeared in *The Iron Trade Review* of March 2. Prominent inventors, manufacturers and lawyers give strong testimony to the advisability of the court proposed and on the general proposition are unanimous. The divergence of views develops when the appointment of the court, the tenure of office and the incorporation of a technical element among the judges are considered. It will be seen on reading the appended correspondence that the legal mind does not see the situation as it confronts the inventor and manufacturer. And this view of the question is not confined to lawyers with little practice in patent litigation. Each of the attorneys here quoted is well acquainted with the progress of patent practice. One is a member of the committee which drafted the bill of the American Bar Association, and another is the author of the Johnston bill. Both these bills have been submitted to Congress, referred to the Committee on Patents and there have come to a halt.

The difficulty of reconciling the wishes of adherents of the respective bills and getting any united action in urging the passage of either is very evident from the arguments presented before the Congressional Committee on Patents. The stipulation calling for the recognition of engineering talent in the make-up of the court evidently would arouse much opposition in legal circles. The Patent Bar Association of Washington, D. C., has suggested an alternative course which does not however incorporate the technical element just mentioned. This proposal is in the way of a compromise bill creating a Court of Patent Appeals and vesting in it the jurisdiction exercised by the Supreme Court of the United States in patent causes, prior to the creation of the Circuit Courts of Appeals, and having the power to review orders of the courts below relating to injunction. The Circuit Courts of Appeals now have appellate jurisdiction as to injunctions only in those cases in which they exercise final jurisdiction.

One member of the American Bar Association, the president of a large corporation and having a long experience in patent litigation, says: "I am glad that you are interesting yourself in the matter because it is perfectly certain that a single appellate court in patent causes is of the utmost consequence to the welfare of this country. At present we have a number of circuits handling these cases and a judge in Illinois is as likely as not to rule differently from another judge in New England or one in the West. Some judges are notoriously out of sympathy with patent matters. They could not very well tell the difference between a patent and a hole in the ground. There are others, broad and capable, with such an experience of our laws and legal practice in general that an attorney has complete confidence in getting a fair hearing. The situation is such that now a lawyer carefully weighs the judges and does his best to bring the case before one having a recognized capacity for patent work. This ought not to be the case and a single court would lessen the cost of litigation and bring about a greater promptness and certainty."

This gentleman was decidedly opposed to the inclusion of an engineering element and believed it would tend to narrowness. He favored a six-year term, the judges to be selected from the various circuits. An opportunity to appoint new judges rather than transfer them would in his estimation be too tempting to the politicians. On the other hand, the return of these judges to the respective circuits after their term of office had expired would carry to the several sections of the country the benefit of an intimacy with patent practice in its latest phases, would be of immense worth to the courts where the cases originate, would lessen litigation and tend to harmonious action between various branches of our legal system.

Another attorney with a large practice in patent cases has offered some suggestions from which we make extracts. It will be seen that he does not fear the addition of an engineering element to the court. "It would be well to amend the bill creating the present Circuit Courts of Appeals. Require the judges of these courts to appoint periodically (perhaps once a year, the judges being eligible to reappointment) by ballot three or five of their number to hear patent causes exclusively; provide extra compensation for the judges thus designated; have the same body of men appoint for a limited term by ballot two scientific and technical men of practical experience and standing in the profession of mechanical engineering to sit with the three judges designated as above and to have the same compensation, duties and powers; and make the decisions of these five or seven judges binding upon the whole country. These five or seven judges should sit at intervals in New York, Chicago, and some Western city, say San Francisco, as the exigencies of business required. Perhaps the five judges might themselves appoint their two technical associates. This general plan would avoid some of the opposition to so radical a step as the creation of an entirely new court. It would leave the selection of the judges to men who ought to know something about it and would give representatives of all sections of the country a voice in the appointment of judges who should decide matters of interest to the whole nation. The designation of particular judges to hear particular classes of cases is not new. It would not require the creation of any new officers, except the technical judges; and the desirability of such an adjunct to a patent court is universally recognized. It has even been in contemplation in the framing of one section of our present patent law and has been suggested by the Supreme Court, so this would not contain any wholly new and unfamiliar idea. If a judge were removed from one section of the country to another by appointment to hear patent cases he could be replaced by a judge from the section to which he was sent."

VIEWS OF INVENTORS AND MANUFACTURERS.

Thomas A. Edison's Endorsement.

Your favor of the 8th inst. to Mr. Edison has been carefully read by him, together with the editorial from *The Iron Trade Review*. He requests me to say that he is in entire sympathy with the scheme providing for a Court of Patent Appeals, or in fact with any arrangement by which a definite and final decision may be obtained in patent cases. The uncertainty to which inventors are subjected, as pointed out in the editorial, is extremely harassing, and this is particularly true when the inventors are engaged in actual manufacture. It is a good deal better for a manufacturer to know as soon as possible that his patent is invalid than to be kept in doubt for many months, as is now likely to be the case. Furthermore, the possibility of conflicting decisions in different circuits is conducive to hardship and annoyance. The plain truth of the matter is that patent law as now practiced has been so refined and the questions involved are generally of such a metaphysical character that abstract justice is often lost sight of. A court of final appeal in patent cases, composed of competent judges, some of whom at least should have had

an engineering education, would no doubt go a long way towards improving the present situation.

FRANK L. DYER,
Legal Department, Thomas A. Edison, National Phonograph Co., Edison Mfg. Co., Bates Mfg. Co., and Edison Storage Battery Co.

Orange, N. J., March 18.

Co-operation of Manufacturers Necessary.

There is a crying need for a Court of Patent Appeals having jurisdiction throughout the territory for which a patent is granted. There is only one opinion on this subject among those who have any knowledge of patent matters. The various bar associations and industrial associations all favor the establishment of a Court of Patent Appeals. There will be no difficulty in obtaining the necessary legislation, provided the manufacturers and lawyers generally co-operate.

The two bills recently before Congress differed mainly in that one provided for a permanent or unchanged bench, while the other provided for a circulation of the judges. Much can be said in favor of either plan, but neither plan is so defective or objectionable that it should be permitted to stand in the way of the establishment of the court. An effort will be made before the next Congress to secure the passage of a bill substantially like one or the other of those recently considered.

It is to be hoped that you will use your personal influence and the influence of your journal to secure co-operation on the part of those interested. If the views of all interested can be harmonized, and if an agreement can be reached on any reasonable bill, there will be no difficulty in having it placed on the statute books.

P. T. DODGE,
President and general manager Mergenthaler Linotype Co.

New York, March 17.

Differences on Details Delay Action.

The views expressed in the article in *The Iron Trade Review* of March 2, which received the most careful reading on our part, meet with our entire approval, and we agree with you that a determined effort should be made to frame a bill to meet the requirements. There can be no question that a speedy and uniform action by the Courts of Appeals is of incalculable value to all parties concerned. It is to be regretted that a difference of opinion as to the best plan of organization has so far defeated the main object. We trust, however, that when the measure again re-appears for action it will be so modified as to secure the public at large, as well as firms and individuals, and assure a speedy settlement of patent litigation.

INTERNATIONAL STEAM PUMP CO.,
W. Schwanhaussen, assistant to the president.

New York, March 17.

Favors Judges Versed in Patent Law.

The adjudication relative to patents is, we consider, unnecessarily expensive, unnecessarily indecisive in decision and wholly unsatisfactory. We do not think very well of either of the propositions as covered by the statement concerning the bills in the committee, and believe that the committee can prepare a better scheme. We believe further that there should not be assigned to this court the regular justices, but that there should be special judges who have a knowledge both of ordinary law and particularly of patent law.

THE WATSON-STILLMAN COMPANY,
F. H. Stillman, President.

New York, March 10.

Change Needed in Present Methods.

With reference to the Court of Appeals, would say that this is most certainly a very important matter, and we are thoroughly in sympathy with a change from present methods that would bring such a court as proposed into existence. We know of an instance in the case of a patent suit that the counsel for the plaintiff made the statement that if he were sure of his case being heard before a certain judge he would have no fear as to the result. He said that this certain judge had particular and exceptional ability in grasping the merits and operation of mechanical patents, and had a faculty for considering the patent on its merits, being able to distinguish that particular difference between what constituted infringement and what not. It seems to the writer that this court should be composed of a variety of minds, and not alone those of legal training, but fashioned as we understand it after the court of errors and appeals of this state, in which lay minds are brought into the consideration. We think the plan a very important one and one that could not be in working operation any too soon.

GOULD & EBERHARDT,
Fred L. Eberhardt.

Newark, N. J., March 9.

Judges Should Serve for Life.

We have read the editorial from *The Iron Trade Review*, and quite endorse the views expressed in the last paragraph. We believe in a single Court of Appeals for patent cases, and the members of the court ought to be selected from "all available sources, bench and bar alike, and appointed for life." It would be a great mistake for the members to serve for limited periods, as this would constantly change the court, and those that had gained a great deal of knowledge and experience with years of faithful service might be dropped at just the time when they ought to be of most value.

We most heartily approve your suggestion that one or more of the judges ought to have mechanical and technical training, as these qualities would tend greatly to strengthen a court, with the other members whose experience and knowledge strictly embraced legal experience.

F. F. PRENTISS,
President, Cleveland Twist Drill Co.

Cleveland, March 9.

A Great Need of Uniformity.

There is certainly a great need of uniformity and centralization in the patent courts. The writer is firmly of the opinion that a court such as is contemplated should be appointed for life and members selected from among existing judges and men who have records by which they can be judged, as stated in the editorial. Particular attention should be paid, however, to the qualifications of any such appointees, and there certainly will be no trouble to obtain judges who are capable of passing on mechanical questions, as we have a great many jurists in this country who have been doing this work exclusively for many years and are undoubtedly well fitted to pass on knotty questions of this character both from legal and technical view points. It would seem as though technical judges of known ability could be found without trouble in this country.

OLDS MOTOR WORKS,
N. T. Harrington.

Detroit, Mich., March 23.

Four Attorneys and Three Mechanical Experts.

The question of patent litigation is a vital one to all manufacturers of specialties. The way patent cases are now conducted in the Circuit Courts of Appeals is an abomination. Many of the judges have no mechanical ideas or education at all, and models made, taken apart, and fully explained, are incomprehensible to their minds. What we should have in this country is a court organized along the lines of the last suggestion in the editorial. We should have broad minded, capable and incorruptible judges on the bench. There should be a court composed of seven men, four of them strong in law and three of them among the best mechanical engineers that the country could afford. And there should also be an act passed that when any one brings a suit for infringement, that suit shall be prosecuted with vigor. It should not be possible for men to bring a suit and circularize the trade and let the thing drag on year after year. Many such suits

are brought and they are only brought for "bluff" and to try and crush a weak and perhaps a growing concern. We feel that the manufacturers in every line who work under patents, will heartily endorse and help support a movement that will bring around results promising something different from the practices of today.

CLEVELAND PNEUMATIC TOOL CO.,
Per C. H. Starr, Secretary.

Cleveland, March 10.

Engineering Talent Should Rank with Legal.

I am very glad to see that you have taken up the matter of a Court of Patent Appeals. That there exists great opportunity for improvement in our present administration of patent law cannot be doubted by anyone who has had occasion to interest himself in the matter. Any court of appeals which might be established would perhaps benefit the situation in that its decision would be final; but the operation of such a court would approach the ideal only when it combined within itself a thoroughly legal and an equally able engineering mind.

Cases have been brought to my attention where devices of even the simplest mechanism have come up for consideration and where it has been very nearly impossible to convey to the very capable legal talent facts and figures which would have been apparent to an engineer upon the instant. Most certainly engineering ability should be rated upon a par with legal qualifications in the make up of any court such as is under discussion.

EXPERIMENTAL DEPARTMENT OLDS MOTOR WORKS,
H. E. Coffin.

Detroit, March 23.

Judges who Can Sift Expert Testimony.

I have read with interest the editorial on a Court of Patent Appeals in your issue of March 2. Having taken part as a technical witness (or expert as he is sometimes properly or improperly termed) in many patent litigations, I appreciate the awkward and unjust situations which result from the present system, and sincerely hope that the much needed Court of Patent Appeals will be established. The sooner this is done the better.

As to the constitution of such a court, I think the willingness of the judge to serve on a patent court should be given considerable weight. To compel an unwilling judge, by enforced rotation, to try such very technical cases as many of these necessarily are would be to jeopardize justice. Appointments for life involve great risks, as it is difficult, if at all possible, to correct mistakes made in such appointments, or to remedy deficiencies that may develop. Repeated re-elections by those who are concerned with patent litigations would seem to be the ideal method, though impracticable in this form. A periodic re-election by the judges of the lower courts from among themselves, might be a practical approach to this ideal.

While it evidently is very desirable that the judges of such a court should be able to "read a drawing," yet it is generally possible to overcome this by means of sketches in perspective or by models. It seems more important that they should have a general knowledge of the fundamental principles of physics, including as it does mechanics, which are so frequently involved in patent litigations. It is the duty and province of the technical witnesses to explain to the court the physical principles involved in the particular case, and to facilitate a clear understanding by means of sketches or models; but as some of these witnesses are experts in the art of deceiving without lying, it would aid the court greatly if it understood enough about the fundamental technical points, to be able to decide correctly which of the witnesses are, and which are not trying to deceive.

In some European countries I understand the court selects trustworthy, impartial men of recognized standing in their respective fields, and refers the technical questions to them for decision, a practice which has many good features if properly carried out. An approach to it would be to grant the court the right to consult impartial experts on the technical disputes involved.

CARL HERING.

Philadelphia, March 15.

Specialization Should be Carried into Courts.

Having confined myself chiefly to engineering matters, I do not feel in a position to comment on the details of legal matters. But, being a "layman" from the legal standpoint, I feel that there are points about the law that I see with better "perspective" than most lawyers who are deeply in it. What impresses me most is that 50 or 100 years ago one lawyer could be sufficiently versed in almost every branch of human knowledge to be able to judge with a tolerable amount of correctness. As knowledge has increased, however, there seems to have been a vastly greater amount of specialization among men of science than there has been among men of the bar; so that at the present time we find legal men vainly endeavoring to maintain their dignity and give correct decisions regarding all kinds of technical detail of which they really can know practically nothing.

Hence the idea of establishing a special Court of Patent Appeals strikes me very favorably as being a step in the right direction, not only so far as patents are concerned, but in regard to legal matters in general as well; and I should be greatly pleased to see such a court established.

JOHN C. TRAUTWINE 3d.

Philadelphia, March 10.

[In reply to an inquiry, Mr. Trautwine writes further as below:]

"I understand that you would be glad to know of any reasons for appointing the judges for the patent court for short terms. I have only a back-handed reply to this, inasmuch as I can conceive of no reasons that would overweigh the advantages which appear to me would obtain by the adpotion of a long term. Patent affairs are so complex, and knowledge of the "prior art" is so highly important, that it would seem most desirable to have the terms as long as possible (during good behavior)—not to be limited by even Dr. Osler. I myself believe that teachers should be pensioned after five years of service, as the green teacher has always been able to teach me more than the older man who gets into ruts and who unconsciously gets to know so much he cannot back down to the level of the minds of his students. But these patent men would be so constantly in touch with new ideas that there would be very little chance for the mind to become stubborn with the inertia of old ideas."

Judges with Engineering Training.

I am heartily in sympathy with the views you express in the editorial and hope that something may be done during the Congressional recess in the way of framing a bill for a single Court of Patent Appeals which may meet general approval It seems to me highly desirable that the judges of such a court should be appointed either for life or for a very long term and that some of the judges should be men who have received an engineering training.

WM. KENT.

Syracuse University, Syracuse, N. Y., March 8.

Would Be a Great Relief.

Litigants have experienced a great deal of difficulty in having their cases properly and promptly adjudicated in the United States appellate courts as at present constituted, and I have no hesitancy in stating that a Court of Patent Appeals as described in *The Iron Trade Review* of March 2 would be a great relief to litigants.

JOHN C. HIGDON,

St. Louis, March 9.

FROM THE ATTORNEYS' STANDPOINT.

Engineering Training not an Advantage.

Your article is entirely correct in stating the present situation of the bills providing for a Court of Patent Appeals. The most prominent cause of divergence of opinion relates to the appointment of the court. There is a very strong feeling on the part of many in the profession that it would be most dangerous to appoint a court having final jurisdiction in patent matters, without some provision that should secure at least a proportion of experienced patent judges.

I cannot quite agree with you as to the suggestion of the desirability of having for judges those who may have had an engineering training. Of course, I do not mean to say that that fact should be a disqualification, but, as a general rule, to which, of course, there may be individual exceptions, it is a disadvantage for a judge, as it seems to me, in determining patent causes, to be personally a mechanical expert, and for this reason: One possessed of that knowledge is under the constant temptation to decide cases from his own views rather than from the evidence. The function of the expert is to explain technical matters, and in actual practice to present an argument to the court in support of his own opinions; and it is the business of the court to determine between differences of opinion. The patent law is nothing but the application of the statutes to a particular class of subjects, and if the lawyer is properly equipped and the judge is conscientious and attentive, there should be no more difficulty in explaining the question of fact involved in a patent case, so as to make it clear to the court, than in any of the cases where expert evidence is required.

There is no doubt that a court of final appeal, for the purpose of securing uniformity of decision and strengthening that branch of our law, is most desirable. The practical difficulties in the way are very great. I think the one I have mentioned in regard to the composition of the court, might be got over. The question then arises whether appeals in patent cases shall go directly from the decision of the judge of ciruit to a central court at Washington, or whether there shall be an intermediate appeal to the Circuit Courts of Appeal. Before the latter were constituted, appeals lay of right to the Supreme Court and no hardship was felt except that of delay. Under the proposed Court of Patent Appeals the delay could probably be avoided, but the number of patent causes I think have increased, and particularly those arising in the South and West. The people have become accustomed to the Circuit Court of Appeals, where a hearing can be had within the circuit in which the suit is brought, and it is urged that it will be a hardship to return to the old way and compel parties in patent cases from distant parts of the Union to go to some place to have their appeal heard which might be far away from their homes.

The desirability of a Court of Patent Appeals becomes more evident every year, and I am inclined very strongly to the opinion that we shall finally have one.

EDMUND WETMORE.

New York, March 27.

Danger of Getting Experts who are not Lawyers.

The question of a Court of Patent Appeals is one of great importance to the country and has been the subject of very careful study by many of us who are deeply interested in it. Fifteen years ago a bill was drawn and submitted to Congress at the same time that the measure creating the Circuit Courts of Appeal was up, and was postponed by Congress at that time to await the operation of the Circuit Courts of Appeal. The effect has been exactly as was then anticipated. Nine courts of last resort are bound to differ upon the same subject, and we have, therefore, great diversity of decision.

The American Bar Association has taken up this question and studied it carefully, and a committee appointed of which Judge Robert S. Taylor is the chairman, the other members of the committee being Edmund Wetmore of New York, William C. Strawbridge of Philadelphia, Melville Church of Washington and myself. We have provided a bill for the creation of a Court of Patent Appeals to be composed of seven judges—or five might be enough—although we would prefer seven, one of whom is to be appointed by the President and confirmed by the Senate in the usual manner. This judge is to be the only one appointed. The other judges are to be selected by the Chief Justices of the Supreme Court from the circuit and district bench and transferred to the Court of Patent Appeals for a term of six years each. This mode of selecting the judges we regard as of the highest importance. Its purpose is to secure upon the bench men of tried and trained experience, and also to avoid a danger, which we feel is a very serious and approximate one, of getting upon the bench men who are mechanical experts, but not trained lawyers.

The trial of patent cases differs very little from the trial of ordinary legal questions, and experience has demonstrated that the best patent judges have been men who were eminently good and experienced common law lawyers before they undertook to handle a patent case. No better men could possibly be selected to constitute this court than those who constitute the present Federal bench, and the mode of selecting the men to sit upon the Federal bench has proven to be so eminently wise and successful that we do not believe any improvement can be made upon it.

There is a current belief, which I see expressed in your article, that men of special training and education in mechanics are necessary for the proper disposition of patent causes. This is true in a certain sense, but this belief constitutes the principal danger in the organization of a Court of Patent Appeals. If the Court of Patent Appeals is to be composed of a number of judges, all of whom are to be selected by the President and confirmed by the Senate, they will be selected by the appointing power largely under the influence of the opinion which you express, and which, while true in one sense, is very untrue in another. Experts, in order that they may be competent to pass upon technical questions of mechanics and science, must be thoroughly trained in the details of the art, but the man who is called upon to weigh diverse opinions of experts pitted against each other, must be trained far more in the determination of controverted questions of fact, than in the technicality of the subject involved in the controversy. Hence it is, that if a court should be created composed of five or seven judges, all of whom were to be appointed by the President, there is a serious danger, I may say almost a certain danger, that this court would be composed to a very great extent of technical experts rather than of lawyers, and those of us who are in the habit of trying patent cases in the courts, are of one mind with reference to the evil of such result. We would greatly prefer to maintain the present system, and try our cases before the Circuit Courts of Appeal with all of its diversity of opinion, than to run the risk of being landed in a single court of last resort composed of men, or dominated by one man, without judicial experience.

ARTHUR STEUART.

Baltimore, March 16.

Against the Bar Association Bill.

I am greatly interested in the subject of a patent court, and in fact have probably given more time to it than anyone else. The bill which I favor is Senate Bill 4656. The Bar Association bill provides for seven judges and rotation in office. The bill to which I refer, however, provides for five judges of permanent appellate jurisdiction, and follows closely the act establishing the Circuit Courts of Appeals, with such changes as are necessary to assimilate the practice of the new court, so far as it may properly be done, with that of the Supreme Court of the United States.

The Bar Association bill can never be passed, since the circuit judges do not wish to be taken from their circuits

temporarily; and a distinguished member of the judiciary committee (a man of such influence that I am sure that no bill which he disapproves would pass the Senate) told me that the bill was very objectionable and "would make a kaleidoscope of the circuits." The main objection to the Bar Association bill is that it is unconstitutional, and that if it passes and the Supreme Court should hold that the act was unconstitutional the work would be thrown away, and it would probably be impossible to get Congress to pass a new act.

I enclose you a copy of the bill which I prefer, and of which, in fact, I prepared the text. Of course it died with the present Congress, but it will be promptly introduced in the next Congress without material modification except as to the time of going into effect and so forth. Concerning this bill I desire to quote from a letter received from Albert H. Walker, Esq., the author of a well-known text book of patent law. In explanation of it I may say that I had previously prepared and submitted another bill which was in the main along similar lines, but included some matter concerning suits against the United States, which it seemed advisable to omit for reasons of expediency. Mr. Walker says:

"I shall be glad to be cited, on any occasion, as an endorser of your substitute bill (House Bill 13,087) in its entirety, as being an altogether suitable and excellent solution of the problem with which it deals. I feel very sure that if Congress will pass, and the President will approve, that bill; the resulting court will be highly beneficial to the administration of justice, and to the progress of the useful arts; and will give entire satisfaction to the people of the United States." * * * *

"I sincerely congratulate you upon the excellent and effective work which you have done in respect of the proposed legislation; and I hope that your substitute bill will be enacted into law, and that you will receive from the profession the credit for its authorship. I am inclined to be rather critical of such work, and I have examined your original bill and your substitute bill with rather close attention. You have received a copy of my letter of Feb. 1, 1904, in respect of your original bill, and noted what view I took of it at that time; and I am now glad to assure you that your substitute bill has my entire and unqualified approval, as being exactly what is wanted at present, without surplusage and without omissions."

T. J. JOHNSTON.

New York, March 28.

A Court with Changing Personnel.

I find this editorial fully expresses the general state of opinion among members of the patent bar in this locality, and I believe that there is general sympathy with the thought advanced by you that the advocates of the two different plans for the establishment of the patent court should give and take until their differences are removed; in other words that the real thing of importance is to get together on some proposition and get the project established. Both arguments naturally appeal to one, but I think that neither of these supposed underlying objections would be realized in practice, or if realized would justify longer delay in attaining the desideratum of bringing patent practice to a fixed and certain basis.

The only suggestions that come to me as I read your able editorial, are the following: In the absence of agreement as to which is the better plan, that which involves assigning justices from the different circuits would be preferable to the plan of appointing justices of a patent court for life, because it would be easier to change from the former to the latter than it would from the latter to the former.

I do not believe that a changing personnel of the court would necessarily involve unstability of interpretation of the laws, as a decision of the court would be a binding precedent not to be disregarded by whomsoever rendered. The importance of changing personnel in the court, with the introduction of new thought and life and consequent avoidance of getting into ruts, outweighs any possibility of unstability in the interpretation of the law, with this plan. It will doubtless be easier to secure the passage of a bill providing for the assignment of justices from different courts than to secure the passage of a bill involving an appropriation of additional salaries.

You have already mentioned the advantage of being able to select justices with particular aptness in dealing with patent cases; or putting the matter the other way, justices who have served in circuits where patent litigation is frequent, and opportunity for becoming familiar with the patent laws is correspondingly greater. I do not appreciate the importance of having any of the court experts in mechanics. The wide diversity of sciences would make it impracticable to have a set of men individually trained in different lines. Moreover, the plan of having a specialist in a court comprising a number of justices, would merely mean that that particular individual would outweigh the others in cases involving his particular line, which would be undesirable. Any man with the intelligence of an average Federal judge, could not hear patent cases for a year or two without becoming broadly fitted to comprehend a properly presented case in any line, and I believe that in appointing to the appellate patent court only men of such experience from the circuits, better results would be attained than if the members of the court were appointed for some supposed special qualification in any scientific line.

The foregoing thoughts have doubtless already been suggested and may be wholly outweighed by the opinions of others; I only present them as indicating the opinion of one member of the patent bar who has given this subject some little thought. Assuring you of my sympathy with the project and willingness to subordinate my ideas to what may seem to be the opinion of the majority, I remain.

HERVEY S. KNIGHT.

Washington, D. C., March 10.

Action Expected by the New Congress.

You have stated the matter fairly and intelligently. There is great need of a Court of Patent Appeals. Views differ as to the composition of the court; but the final result will be, in my opinion, the giving of the President a free hand in the selection of the judges. The paramount importance of the tribunal, dealing as it will with interests of great magnitude will render him careful in the appointment of competent persons. I look for concerted action at the next session of Congress.

MELVILLE CHURCH.

Washington, D. C., March 23.

It is stated that the Lake Superior-Pittsburg party, that has for the past five years been developing copper mines in southern Arizona with success, has taken a large Montana mine and will extend its operations very materially.

It is officially announced at the general offices of the Pennsylvania railroad that the company has decided to purchase $1,080,000 worth of motive power for delivery in September and October of this year. The order will consist of 38 freight locomotives, 15 passenger engines and 15 shifting engines. All of the new motive power will be equally divided between the northwest and southwest systems of the Pennsylvania lines west of Pittsburg. It is also announced that a total of 78 cars will be added to the equipment of the Pennsylvania lines west of Pittsburg during the present year, as follows: Forty-one passenger coaches, four combination baggage and passenger cars, 14 baggage cars, eight baggage, mail and express cars, two dining and nine postal cars. The baggage and mail cars will be built by the Pennsylvania shops at Columbus.

A NEW CRANK SHAPER.

The Queen City Machine Tool Co. of Cincinnati, has a new shaper which closely follows the lines of the 16-in. machine illustrated in *The Iron Trade Review* of Sept. 1, 1904. The present tool, Fig. 1, is a 24-in. crank shaper with a back-gearing ratio of 29 to 1 as illustrated by Fig. 2. The column is of large proportions, very heavy, and is reinforced at proper points to resist working strain. Bearing for ram is

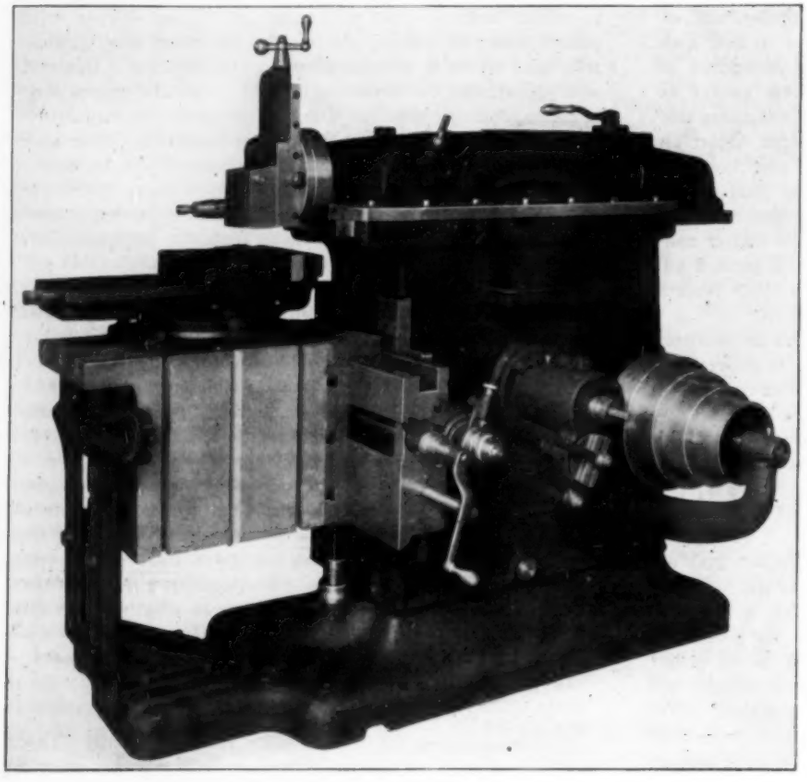


FIG. 1.—A NEW 24-IN. BACK-GEARED SHAPER.

40 x 11 in. and ways overhang, especially in front, giving the tool increased stiffness. The arch construction brings the maximum section of metal into service when the cutting tool is in its extreme forward position. Length of stroke and position of ram can be changed without leaving the work, and while the tool is in motion or at rest.

The heavy rail has 9-in. front and 1¾-in. top wearing surface. Cross traverse is 30-in., and screw has graduated collar. Cam at this point provides for rapid changing of feeds, from zero to extreme, without stopping machine. Vertical adjustment is effected by bevel gears protected from chips and dirt, and provided with ball bearings. An improved telescopic screw does away with cutting a hole in the floor.

Rocker arm is connected to ram by link giving a straight pull and an even cutting speed, with a very quick return, and no lost motion. This connection has been illustrated in *The Iron Trade Review.*

The table is box form, T slotted on top and sides, has V for holding shafts and similar work vertically, and can be readily detached from saddle. Extension provides for broad clamping surface, utilizing the full length of stroke. Outer support is furnished on all 24-in. machines, without extra charge.

Vise is planer type, and has a base that can be firmly bolted to table. Swivel is held to base by two steel planer head bolts. Head swivel is held in the same manner; both are graduated, and can be set at any angle, quickly and accurately. The down feed screw to head has a graduated collar.

All flat wearing surfaces are scraped to a standard surface plate; are extremely wide, and so gibbed as to permit of close adjustment for wear. All column holes are unusually long, and bushed, providing for the maintenance of original centers. Means have been provided for complete lubrication. All pinions, bevel gears and vise jaw plates are steel. All gears and T slots cut from solid stock. Wrench connections are hardened. Feed gears are covered. The large opening under the ram provides for key-seating shafts or similar work of any length. Each machine is belted and thoroughly tested before leaving works. Power down feed; concave attachment; tilting and revolving table; mold makers' vise; mandrels; index centers, etc., furnished on order.

The merchant engineering business heretofore conducted under the firm name of Wm. T. Bonner & Co., Boston, has been incorporated and will hereafter be operated under a charter granted by the commonwealth of Massachusetts to the Wm. T. Bonner Co. The scope of the business will be extended to cover a much larger line of steam plant accessories than has heretofore been attempted and more attention will be given to the manufacture of standardized specialties for high pressure and superheated steam. A full line of cushion pressure seated control cocks, blow off and other valves of a new type design by Mr. Bonner will be manufactured in all sizes up to 4 in. The New York sales office will be continued at 141 Broadway in charge of an expert steam specialist, who will devote his entire attention to the trade in that vicinity. Agencies and distributers will be arranged for at Baltimore, Norfolk, Savannah, Chicago, St. Louis, Denver, San Francisco and other large centers, and every effort will be made to extend the use and usefulness of "Wiltbonco" specialties.

The McClintic-Marshall Construction Co., Pittsburg, has been awarded the contract for the erection of the plants of Woodhouse, Bopp & Co., and the Kinnear Pressed Radiator Co., to be built at West Pittsburg, Pa., which is a short distance from New Castle. The silk mill building of Woodhouse,

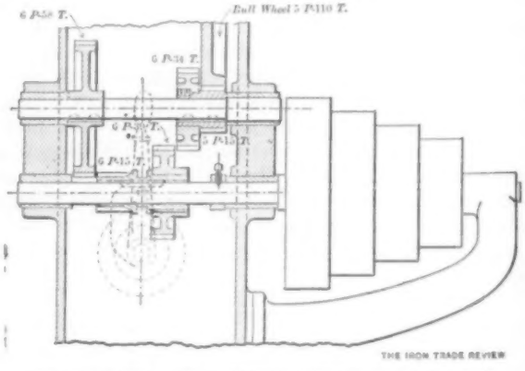


FIG. 2.—BACK GEAR ARRANGEMENT OF 24-IN. SHAPER.

Bopp & Co. will be 90 x 540 ft., while the building of the Kinnear Pressed Radiator Co. will be 90 x 500 ft. About 1,000 tons of structural material will be required.

LAKE SUPERIOR IRON MINES.

Extensive repairs on the Duluth, Mesabi & Northern ore docks, Nos. 1 and 2, at Thirty-third avenue west, Duluth, have been completed and are in readiness for the shipping season. The extension to No. 3 doubles the capacity of the dock. Work on that dock has been carried on throughout the winter. Work is being pushed at the Great Northern ore docks at Allouez so that they will be in readiness for the season's shipment. Dock No. 2 at Allouez is being strengthened and double switches are being put on all of the docks.

It is expected that the new plant for stripping the Grant mine of the Jones & Laughlin Steel Co. will be installed and in operation by Aug. 1. Grab buckets will be utilized for stripping the over burden and for unloading ore. There are about 1,000,000 yards of material overlaying the ore deposit at the Grant mine, and the stripping will be quite deep.

The Duluth Mesabi Iron Co., Duluth, Minn., recently incorporated with a capital of $500,000, by Marcus F. Fay, Franklin W. Merritt, Cyrus T. Crandall, Lucian R. Barnes and Simond Clarke, has twenty-two 40-acre tracts. They are situated in 59-14, on the Eastern Mesabi range. The company does not anticipate doing any mining this year, but expects to put on drills and thoroughly explore the property. The properties are all well located on the range, lying between granite and slate. The company states that it already has above 750,000 tons of a high grade ore, actually shown up. This ore runs from 57 to 68 percent iron and is low in phosphorus. It is the best grade of hematite ore. The work that has been done on this property was done right up against quartzite, greenstone and granite. The company feels confident that within the near future it will be able to show up a large amount of high grade ore.

Many ore and grain vessels will be loaded this week at upper lake ports, especially at Two Harbors and Duluth. The mines of the United States Steel Corporation are all shipping their daily hoist, and many of the independent companies are sending down all ore they mine daily. Of course nothing is yet done at steam shovel mines, for it will be a week or two before the frost is out of the ground. The first ore to reach the lake was at Two Harbors on March 21, and ore has been coming to all points since then. The first cargoes to be loaded will probably be at the same port. The ice is still rather heavy around the docks. In 1904 the first ore was received at Two Harbors on May 25, and two years ago on March 24.

Mines operated by Pickands, Mather & Co. will be loading ore for dock shipment in a day or two. Those at the eastern end of the Mesabi will be loading first. The old Richmond mine, Cascade range, is to resume, orders to that effect having been received lately. It is now a part of the Hanna group. Its shipments will be larger than ever before. The Hanna mines on the Mesabi, including the Leonard, should ship not less than 600,000 tons this year.

CINCINNATI MACHINERY MARKET.

CINCINNATI, April 3.—The conditions in the machinery trade in this city are reported as generally quite satisfactory. The past month in point of orders has been the largest of the year and there is steadily increasing activity reported. Lathe and planer builders are especially well pleased with the situation. Drill makers have some increase to report but in this line trade is not so active as in some of the other lines. The shops are all running in good shape and working forces are being steadily increased.

Business has been secured from the Panama Canal Commission and it is expected that some of the Panama Canal Commissioners will make a visit to this city in the near future to make further purchases of machine tools.

The coming convention of the National Machine Tool Builders Association, which will be held in Washington on April 11 and 12 is an interesting topic of discussion among machine tool firms, and Cincinnati as usual will be well represented. Two subjects which will be taken up at this meeting will be the tariff and a proposed agreement on a standard of motor to be used in connection with motor-driven tools. A committee has been appointed to prepare some outline for discussion on the standard motor proposition and this subject in itself will be of sufficient importance to insure a large attendance, it is thought.

On Thursday, March 30, there was a formal opening of the new office of the Cincinnati Metal Trades Association. A luncheon was served and a general social time was made of the affair. There was a large attendance, and the local machine tool interests showed that appreciation of the value of their association was well maintained.

The Cincinnati Milling Machine Co. reports an active demand for its product and that orders for the month of March were the largest for some time. The company will materially enlarge its plant, and work on the addition will begin in the near future.

The Cincinnati Planer Co. states that business the past month has been excellent. Among orders received was one from the Panama Canal Commission for a 42-in. planer.

Greaves, Klausman & Co. are re-designing their line of patternmakers' wood-working machinery, bringing these machines up to highest efficiency. They are also adding new features to their engine lathes, and are now building a line of double back gear lathes. This firm is arranging to build an addition to its plant which will add about 3,000 sq. ft. of floor space to its present capacity. The addition has been found necessary to relieve the crowded condition of its shop.

The Streit Machine Tool Co. has now perfected its 2 and 4-cylinder automobile engines, and finds and increasing demand for this class of machine. In its other lines trade is also active and business satisfactory.

The Lodge & Shipley Machine Tool Co. regards conditions as quite satisfactory. With a steady run of business its plant is running normally.

The John Steptoe Shaper Co. has had a good month's business and is rushed to keep up with demand.

Schumacher & Boye report trade good.

The Cincinnati Machine Tool Co. is enjoying an increase in orders and a satisfactory business. Inquiries are good and the outlook favors continued improvement.

The United Foundry Co., a new concern, to have a capital stock of $25,000 and to do business in this city, was incorporated at Columbus March 29 by John W. Molloy, Henry W. Mueller, Frank Grieme, George Liable and Chris. Hasecoster.

The stockholders of the Iron Castings Co. meet on April 28 to dissolve that corporation. The company owns a foundry plant at Gest street and the C., H. & D. Road, and adjoining the G. A. Gray Co., which has absorbed the foundry company, a $50,000 corporation.

Homestead Record Broken.

During the month of March the Homestead works of the Carnegie Steel Co., the largest steel plant in the world, broke all its previous production records. During the 31 days of this month 190,000 tons of Bessemer and open-hearth steel ingots were cast, the Bessemer department producing 40,000 tons open-hearth department No. 3 containing 24 50-ton furnaces, 80,000 tons and open-hearth departments Nos. 1 and 2 produced 70,000 tons. In several of the open-hearth furnaces where the record number of heats has been 14 during a week, this was increased to 16, while one tapping foreman succeeded in tapping five heats in the phenomenal time of 25 minutes. The 35, 40, 42, 48, 84 and 140-in. plate mills all established new records, while the billet and blooming mills operated with a loss of only 10 percent for scrap, the net tonnage produced being 171,000 tons. The total tonnage of finished product produced amounted to 136,800 tons of plates and shapes.

CANADIAN INDUSTRIES.

TORONTO, CANADA, April 3.—The Montreal Steel Co. will shortly enlarge its plant by adding another department to manufacture the special kind of steel required by the Canada Car Co. and some other industries. At a general meeting of shareholders held at Montreal on March 30, a by-law was ratified authorizing the directors to issue additional common stock for this purpose to the extent of $300,000 which will be offered to the shareholders pro rata at cost.

The rate payers of the village of Morrisburg have adopted by a large majority by-laws for the development by the municipality of electrical power, and granting free power, water and light to J. Wesley Allison, of New York, for the establishment of a tin plate industry.

James Gayley, first vice-president of the United States Steel Corporation, accompanied by Messrs. Morrison and Farrell, of the same organization, have been visiting several points in this province, presumably with the object of selecting a site for a plant. They spent considerable time in Port Colborne, Ont., on the lake shore, where they were met by the town officials and carefully inspected the ground.

The Guelph Foundry Co. is enlarging its premises and will erect a molding shop 600 ft. in length.

The market continues active with every prospect of a busy season, the optimistic tone prevailing being indicated by the large number of new industrial companies being organized in connection with different branches of the trade. The principal factors of the situation are the great amount of railroad construction in progress or definitely arranged for and the building up of the Canadian West. The setting in this early in the season of a steady tide of immigration into the new provinces tends to stimulate production in view of the increasing needs of the western market, hitherto mainly supplied from Eastern Canada, but a noteworthy feature of this expansion is the rapid development of manufacturing industries in Winnipeg and other Western points. The local building trade in Toronto bids fair to be very extensive, promising an active demand for hardware and structural iron and steel, but is rather late in opening owing to the scarcity of brick and the uncertainty of the labor situation. It is not improbable that the demands of the men engaged in the principal branches may result in a protracted strike.

At the annual meeting of the Nova Scotia Steel and Coal Co., held at New Glasgow, N. S., on the 29th March, R. E. Harris, K. C., was elected president in succession to the late John F. Stairs.

The Manitoba Iron Works, Winnipeg, are extending their forge shop to double its present size to provide space for heavy bolt forging and threading machines.

The Canadian railways have made special concessions to the importers of British tin plate, sheet and structural iron in the matter of reduced freights from the seaboard to enable the British manufacturer to meet American competition. The following tariff which went into force on March 14, is considerably lower than the rates in force last year: Tin plate, Canada plate, black plate, sheet iron, galvanized iron, carloads, to points Peterboro to Belleville, and Toronto inclusive, 13½c per 100 lb.; Hamilton, 14c per 100 lb.; west of Toronto on the main line to Windsor and Walkerville, including St. Thomas, 15c per 100 lb. On structural iron, consisting of beams, channels, angles, tees and zees, girders, carloads, Peterboro, Trenton and west to Windsor and Walkerville, on main line, including Hamilton and St. Thomas, 15c per 100 lb.

The annual meeting of the Canadian General Electric Co. was held here March 21. The report showed profits for the year of $582,519, as against $512,210 for 1903. Dividends of 10 per cent had been paid on the common stock. The directors announced that the business of the first two months of the current year was the largest for any similar period, as contracts amounting to $1,007,000 had been closed by the electrical department, and $381,000 by the foundry department. Application will be made to the government to authorize an increase in the capital stock by the issue of new shares to the par value of $900,000, to be offered shareholders at a premium price.

The following companies have been incorporated under the laws of Ontario:

Union Drawn Steel Co., Ltd., capital $150,000, head office Hamilton; provisional directors, Frederick N. Beegle, Charles Rebeske and James A. McMahon, of Beaver Falls, Pa.; Frederick Davidson, of Pittsburg, Pa., and George Davidson, of New Brighton, Pa.

Lee-Hodgins Co., Ltd., capital $50,000, head office Pembroke, to manufacture machinery, tools, etc., for farmers and dairymen; provisional directors, Thos. W. Lee, Robert J. Hodgins and Peter White Jr., of Pembroke.

Dymond Gas & Engine Co., Ltd., capital $1,000,000, head office Toronto; provisional directors, John Dymond, Aubrey A. Wighton, Chas. J. Gibson and Robert J. Goudy, of Toronto, and Vernon E. Taplin, of Novar.

McKeough & Trotter, Ltd., capital $100,000, head office Chatham, to manufacture mill machinery, engines, etc.; provisional directors, Samuel Trotter, John F. McKeough, Samuel M. Glenn, Robert Gray, Nathan A. Stevens, T. K. Holmes and M. Campbell, of Chatham.

Collingwood Shipbuilding Co., Ltd., capital $1,000,000, head office Collingwood, to acquire the business and assets of the company of the same name; provisional directors, Thomas Long, Henry S. Oster, Wm. B. Raymond, Dalton L. McCarthy, Britton Oster, Frank Ford, Geo. C. Loveys, James M. Ewing and Hugh Spence, of Toronto.

Nanor Automobile Co., Ltd., capital $200,000, head office Toronto, to manufacture automobiles and do business as engineers and founders; provisional directors, Anson G. Ronan, Gordon A. Ronan, Wm. Bullock, E. Ronan and E. Armstrong, Toronto.

Walter Nicholls Motor Boat Co., Ltd., capital $25,000, head office Toronto, to manufacture motor boats and vehicles, engines, etc.; provisional directors, Walker N. Nicholls, Frederick Nicholls, Henry G. Nicholls, A. Augstrom and H. H. Macrae, Toronto.

The shop employes of the Crocker-Wheeler Co., electrical manufacture at Ampere, N. J., have organized a beneficial association which has a number of novel features. Every employee who pays ten cents a week to the association will be entitled to $10 a week for twenty weeks during incapacity through illness. If he dies, his family will receive $100. The payment of twenty, thirty or forty cents a week entitles him to $15, $20 or $25 respectively, with death benefits of $150, $200 or $250. The plan will go into effect April 3. The company has offered to contribute an amount equal to the dues paid to the association. Thus if $6,000 is paid yearly in dues, the income of the association will be $12,000. The company does not require representation in the association, which will be officered and conducted entirely by the employes.

A 37-page pamphlet has been published by Arthur L. Carnahan, Houghton, Mich., entitled "Development of the Lake Superior Copper Mines During 1904." The price is 50 cents.

The car repair shops of the Toledo & Ohio Central, Bucyrus, O., together with a large number of cars, burned March 31st.

A company is being formed at Stillwater, Minn., to manufacture self-feeder and band-cutter attachment to threshing machines. The plant will be an adjunct of the August Jesse machine shop. Frank Eves, of La Crosse, Wis., is the inventor of the attachment.

BILLET AND PLATE PRICES REAFFIRMED.

(Special Telegram.)

PITTSBURG, April 5.—Meetings of the plate and billet associations were held in New York yesterday and today but no changes in the existing schedules were made. While the association price of billets is $21 Pittsburg for both Bessemer and open-hearth, premiums of $4 to $5 are being paid for prompt delivery. Under these circumstances the association mills have decided that no price changes are necessary. The plate manufacturers' agreement to maintain plates on the present basis means that if higher prices are to be paid by consumers in the near future they will be in the nature of premiums. No meeting of the structural association was held.

The billet association is today stronger than it has been for several years and since the new schedule became effective no business has been closed below this basis by any of the mills. While numerous reports had it that the price was shaded on the recent Pittsburg Steel Co. purchase, we have it on the highest authority that the price was $23 delivered. The present members of the billet association are as follows: Illinois Steel Co., Lackawanna Steel Co., Cambria Steel Co., Diamond State Steel Co., Carnegie Steel Co., Lorain Steel Co., Wheeling Steel & Iron Co., Republic Iron & Steel Co., Pennsylvania Steel Co., Jones & Laughlin Steel Co., Sharon Steel Hoop Co., Otis Steel Co., LaBelle Iron Works, Portsmouth Steel Co., and the Allegheny Steel & Iron Co. The only important billet producers outside of the association are the Ashland Steel Co., Tennessee Coal, Iron & Railroad Co., and Colorado Fuel & Iron Co.

A meeting of cotton tie manufacturers will probably be held this week to decide on the price for the coming year.

The eight and ten inch mills of the Greenville, Pa., plant of the Carnegie Steel Co. resumed operations on Tuesday of this week with non-union labor. The Amalgamated scale is being paid in this mill, but no scale has been signed, and many of the former employes have already returned to work. The mill is being picketed, but no trouble has yet been experienced. As soon as this plant is operating successfully, the Girard, O., plant will be placed in operation.

The installation of a Laughlin continuous heating furnace in the plant of the Youngstown Iron Sheet & Tube Co., Youngstown, O., will greatly increase the output of the skelp mill. The furnace was fired last week.

The Railway Steel Spring Co. booked more business in March than any other month during the company's history. Present indications are that many more orders will be received during the summer.

The American Locomotive Securities are now selling at the highest prices in their history, the appreciation in market value from the lowest prices of 1903 being about $23,000,000, or 125 percent.

At the annual meeting of Wm. Jessop & Sons, Ltd., mention was made of the strike of steel molders at the Brightside Works. A member of the union had allowed his dues to become in arrears and his membership thereby ceased. The other molders requested the firm to discharge him and on this being refused, a strike was declared on the ground that by retaining the man who had not paid his dues to the union "the foundry had become a 'mixed' shop instead of being a trade union shop, as previously."

The Cleveland Cliffs Iron Co. has organized the Bay Mills Land & Lumber Co., capital $250,000, to handle the property of Hall & Munson, which the company recently bought. The entire capital stock of the new company is held by the Cleveland Cliffs Iron Co.

CLEVELAND MACHINERY MARKET.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, April 5.

Reports from manufacturers of machine tools are almost invariably favorable. The prosperity prevailing in the iron and steel business has been reflected in nearly all lines of manufacture, and there is a feeling of confidence that the present year will be very satisfactory from a business standpoint.

The Reliance Gauge Column Co. is realizing its expectations for a good business this year. It reports a very satisfactory increase in both inquiries and orders.

The Cleveland Pneumatic Tool Co. states that the trade is brightening, but that it will be months before it gets into full swing.

The Browning Engineering Co. reports that while business is good, it is compelled to work pretty hard for orders.

The Electric Controller & Supply Co. is meeting much success with its new pig magnet for handling all kinds of raw material, such as pig iron, small castings, small scrap, billets, etc. Although the magnet has been on the market but a few months, a large number have been placed with the largest steel mills and furnaces in the country, all of which are giving entire satisfaction, reducing the cost of handling such material at least 50 to 75 percent.

The Chisholm & Moore Mfg. Co. has just completed quite an addition to its machine shop in order to take care of increased business in that line. The company is very busy in all departments of its business and looks forward to a very large year's trade.

The Garry Iron & Steel Co. has discontinued its engineering department and is increasing its roofing, tin plate, eaves trough and paint departments. It is now using all its buildings for this purpose. The company is carrying much larger stocks than ever before to insure customers prompt service. C. S. Bigsby is general manager.

The Interstate Engineering Co., Bedford, has recently closed a good many large contracts, and finds conditions very favorable for an encouraging year in business. At a recent meeting of the board of directors of the company a new secretary was elected in the person of Albert Capelle, of Cincinnati, formerly with the S. Obermayer Co.

The Ajax Mfg. Co. considers the outlook for future business very bright indeed. March was an exceedingly good month with this company, it having received orders for tools from the Missouri Pacific, Lehigh Valley, M., St. P. and Ste. St. Marie railroads, Canadian General Electric Co., Union Switch & Signal Co., and numerous other orders which total up favorably with any of the months of the last two years. Among shipments in March were two large 5-in. forging machines.

The Elwell-Parker Electric Co. reports that its business is excellent, but it consists of miscellaneous good contracts rather than in contracts of striking novelty. The general outlook in the departments of business with which the company is most acquainted is excellent. There seems to be prevalent a tone of confidence in settled prosperous conditions for some time to come. Judging from the present conditions of its own business and its immediate prospects, the company feels that it is likely that it will have to make material additions to its plant in the very near future.

The G. C. Kuhlman Car Co. is about to begin delivery to the Cleveland Electric Ry. Co. of 50 large double truck city cars, which are something entirely new in the manner of construction of city street cars. They are what is known as full-convertible type on one side of the car, and ordinary drop sash construction on the other side of the car. The full convertible feature enables the railway company to change this car from winter to summer use by simply raising the side, including the panels and sash into the roof, where it is self-contained, and is stored there during the summer. In the winter time, this side can be lowered, and the car converted

into a closed car. The Kuhlman factory is very busy with work, building cars for Grand Rapids, Knoxville, Tenn.; Saginaw, Mich.; Syracuse, N. Y.; Schenectady, N. Y.; Memphis, Tenn.; Greenville, S. C.; Bangor, Me.; Keyport, N. J., and Rochester Railway Co., of Rochester, N. Y., amounting in all to about 150 cars.

The Standard Welding Co. reports that orders in all branches of their business are very good and prospects are favorable for a continuance of these conditions for two or three months. The company is preparing to install a 200 h. p. electrical equipment in addition to its present power supply which will give it additional facilities for manufacture. This will consist of engine, direct connected, dynamo and motors. The reports from the company's Chicago representatives, Messrs. McClernan & Orr, are very favorable, with indications for a continuance of the present business conditions for a year. The New York representative also reports similar conditions.

The Motch & Merryweather Machinery Co., successor to Marshall & Huschart Machinery Co., Cleveland, has opened an office in Detroit, in the Majestic Building, under the management of James H. Herron.

James G. Weison was appointed receiver for the Solid Steel Tool & Forge Co., Pittsburg, last week. The company is capitalized at $280,000, and the action was brought by a number of stockholders whose holdings aggregate 447 shares. They allege that since June, 1903, the company has been mismanaged and that it has lost $45,000 and has debts aggregating $100,000 and which are being rapidly increased, and that the company is insolvent. The company has a number of large contracts on hand. The works are located at Tarentum, Pa.

Captain John Mitchell, who placed an order with the American Shipbuilding Co. two weeks ago for two 10,000-ton steamers, has closed a contract with the same company for a steamer to have a capacity of 6,500 tons.

In the United States district court an order has been issued setting aside the order adjudicating the Finlay-Otten Foundry Co., Buffalo, an involuntary bankruptcy. All of the assets have been transferred to the company and settlement has been made with the creditors. The company will be at once reorganized.

Struck by a heavily loaded freight car, which had jumped the track, the brick chimney, 100 ft. high, at the plant of the Thomas Stationery Mfg. Co., Springfield, O., fell to the ground March 31, and crashed into the boiler room of the plant. The accident caused the plant to be closed down for a few days.

The fire which broke out in the punch shop of the Union Drydock, Buffalo, N. Y., March 30, extended to the machine and blacksmith shop, causing a loss of about $75,000.

The pattern storage house of the Sterling Steel Foundry Co., Braddock, Pa., was destroyed by fire this week, the loss in patterns and on building amounting to $15,000.

The Ashland Iron & Mining Co. has bought sufficient of the capital stock in the Ashland Sheet Mill Co., Ashland, Ky., to control it, and the intention is to begin operations in all departments April 17. There will be no change in the management.

The Bessemer steel works and sheet bar mill of the Columbus, O., works of the Carnegie Steel Co. will resume operations shortly. Repairs have been nearly completed and the new sheet bar mill is almost ready to operate.

PRESENT PRICES OF IMPORTED PIG IRON.

Pittsburg and Eastern firms which in 1902 brought in a considerable tonnage of foreign pig iron and billets are already preparing for another import movement. They are offering English pig iron as follows, c. i. f. Philadelphia, New York, Baltimore or Boston:

	C. I. F.	Plus $4 duty.
A—Bessemer ..E. C. Hematite.....	$15.65	$19.65
B—Low Phos..W. C. Hematite.....	17.35	21.35
C—Low Phos..Special Hematite	16.65	20.65
D—Gray forge.G. M. B. Cleveland No. 3.	14.20	18.20
E—Foundry ...G. M. B. Cleveland No. 4.	14.00	18.00
F—Gray forge.G. M. B. Cleveland.....	13.15	17.15

Analyses are as follows:

	A.	B.	C.	D.	E.	F.
Silicon	3.00	2.50	2.25	2.50	2.00	1.65
Manganese	1.30	.35	1.00	.60	.55	.55
Sulphur	.05	.04	.035	.05	.08	.10 to .14
Phosphorus	.06	.04	.035	1.50	1.50	1.50

The price at which the Bessemer iron is quoted is a trifle too high to compete with iron shipped from the Mahoning and Shenango Valleys to Eastern mills, although it would be profitable to import low phosphorus iron. Gray forge and foundry are also too high to compete against Eastern furnaces and the quotations, with the freight added to interior points would make importations entirely improbable. The domestic market must advance from $2 to $3 a ton before importations can be made profitable.

American Foundrymen's Association.

The secretary, Richard Moldenke, announces that the eighth annual convention of the American Foundrymen's Association will be held in New York City June 6, 7 and 8. Arrangements are now being made for headquarters, hotel accommodations and reduced railroad rates, details of which will be published later. A number of interesting papers are promised and the secretary notes that inquiries already received point to a large attendance.

New Record at Ensley Steel Plant.

(Special Telegram.)

BIRMINGHAM, Ala., April 5.—High record for the Ensley steel plant of the Tennessee Coal, Iron & Railroad Co. was made in March. The total output of ingots was 23,003 tons; of blooms and slabs, 19,923 tons; and of rails, 16,244 tons. The best day's record on ingots was 1,020 tons.

Dodge & Day, engineers, Philadelphia, Pa., commissioned some time ago by the Lehigh Coal & Navigation Co. to take charge of its extensive shop improvements at Lansford, Pa., including new buildings, machine tools and electrical equipment, are now taking charge of the erection of a new centrally located power plant. This will provide current for the shops, Tamaqua & Lansford Street Railway, and electrical equipment which will be installed in the mines for pumping and transportation purposes. Dodge & Day are investigating the latter subject and specifications will shortly be sent out. Herbert Clarke, engineer for the Tamaqua & Lansford Street Railway, will co-operate in the matter.

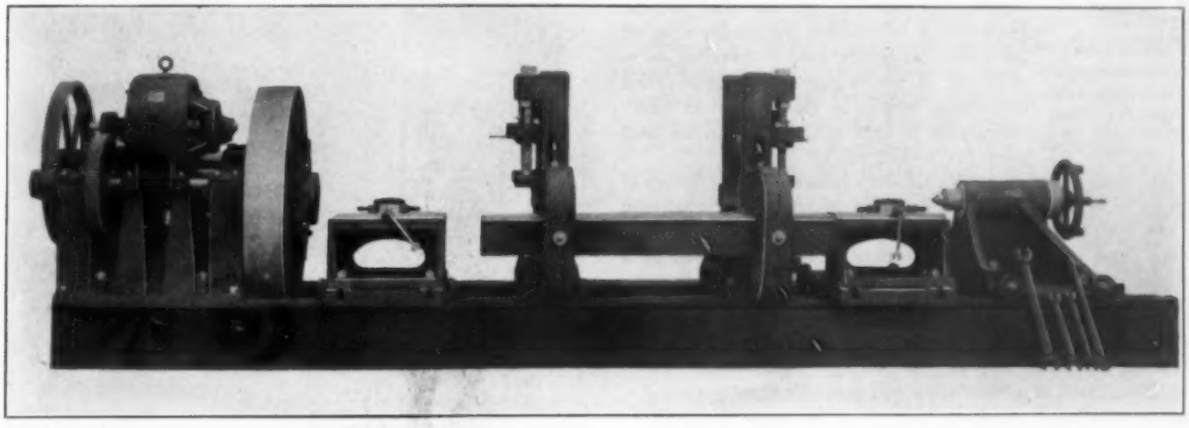
The National Electric Co. of Milwaukee, manufacturer of the Christensen air brake and electrical machinery, is now occupying additional offices in the Old Colony Bldg., Chicago, and has moved the general sales office of the electrical department from Milwaukee to Chicago.

The plant of the Clifton Mfg. Co., Buffalo, N. Y., was destroyed by fire last week. The loss amounted to about $15,000. The company manufactures enameled tubes.

SIXTY-INCH ROLL TURNING LATHE.

This is the heaviest type of roll lathe built by the Wheeling Mold & Foundry Co., of Wheeling, W. Va. The lathe will turn the heaviest chilled rolls for plate mills, using three tools 12 in. long at once, at a cutting speed of 50 in. per minute, and will turn the largest grooved rolls for shape mills at corresponding speeds. As shown in the halftone, the machine is driven by a 15-h. p. variable speed motor, mounted directly above the headstock, but may be arranged to be driven by belt or by constant speed motor and the use of a special speed change device of cut gears designed by this company. The latter drive possesses the advantage of using type of constant speed motor without the expensive necessity of special wiring, controllers and motors. The speed change gearing remains in mesh at all times, thus avoiding the liability of breaking off the teeth when changing speed, and overcoming a prevailing fault of many of the speed changing devices on the market.

The maximum length of bed is 30 ft., giving a distance between the lathe centers of 19 ft. 6 in. The bed is made box section, well ribbed in the rigid form found absolutely necessary in machines of this purpose. The bolts holding down the housings, necking rests and tail stock are T-head. This



A 60-IN. ROLL-TURNING LATHE.

shape is an advantage in that it eliminates the spring which occurs with the use of other varieties. The tail stock, being necessarily heavy, is arranged to move on rollers, along the bed, making this operation one of comparative ease. The diameter of the tail stock spindle is 7½ in. The spindle is a steel forging. The box section type of head stock is used. The main spindle, or dead spindle, 10½ in. diameter, steel forging, is forced into a taper hole in the head stock and extends through its entire length; this construction giving the necessary stiffness where it is most needed. All gearing is machine cut, and is of broad face, giving a ratio of 220 to one. The necking rest is 36 in. wide and is of ample width to prevent chatter in case the cutting tool is used at one side, as in roughing out the fillets at the necks of the rolls.

Various arrangements are in successful use for topping one roll above the other, in turning, but for the heaviest rolls, the goose neck type of housings and topping rig, as shown in the illustration, possesses the advantage of adequate strength, prevents the possibility of a heavy roll falling down and injuring men, and gives a screw and wedge adjustment which is quick, simple and accurate. This machine is supplied with any length of bed necessary, with or without tail stock, and with any length of piano rest. All necessary wrenches and foundation bolts are supplied, and all machines are connected up and run before shipment, to insure thorough satisfaction.

FOREIGN NOTES.

Julian Kennedy, Sahlin & Co., Ltd., of 1 Arundel street, Strand, London, have opened a branch office in Paris at 58, Rue de l'Arcade.

The Vulcan Boiler and General Insurance Co., Ltd., will establish a fellowship at the Manchester University for engineering study and research.

The Government of New South Wales has accepted a tender by the Baldwin Locomotive Works, Philadelphia, for the construction and supply of 20 "P" class locomotives, at a price understood to be about £3,900 each, delivered in Sydney.

J. S. Harmood Banner, recently elected member of the Parliament for the Everton Division of Liverpool, is chairman of the Pearson & Knowles Coal & Iron Co., Ltd., of Warrington.

Thos. Wilkinson died suddenly on Mar. 4. He was a manufacturer of nuts and bolts at Stoke-on-Trent for many years.

Charles Faulkner died at Barnt Green on Feb. 28, aged 89. Mr. Faulkner was a gun-barrel manufacturer in Birmingham for many years; but about 1870 he was induced by Francis Henry Lloyd to attempt the production of cold-drawn tubes. He devised machinery for the purpose, and the Weldless Steel Tube Co. was organized. Mr. Faulkner ceased to take an active interest in the company about ten years ago.

William Hatton died on March 1. at Birmingham, Eng. At the age of 23 Mr. Hatton took up the management of the Bunker's Hill Colliery belonging to Dimmock & Thompson, and four years later, out of money saved from his earnings, he purchased the Gothersley Iron Works at Prestwood, belonging to that firm, and there, with the aid of a small water mill, began the manufacture of sheet iron and Canada plate. In 1860 he joined his cousin, William Hatton, and Stephen Thompson in the purchase of the Bradley Works, near Bilston, from William Baldwin & Co., and there, as Hatton, Sons & Co., he engaged in the production of high-class tin plates and stamping sheets. Four years later the firm bought the Broadwaters Works at Kidderminster from Banks & Morgan for £23,000, and thus became the leading manufacturer of tin plates and sheets in the district. But competition grew acute, and the position being rendered increasingly difficult by the death of some of the partners, the firm was ultimately dissolved. Mr. Hatton was responsible for the Birmingham gauge for measuring sheets and hoop iron. He was chairman of the Tinned Sheet Association from its formation to his retirement. The deceased, who was in his 79th year, for some years had been residing at Brierley Hill, the residence of his eldest son, George Hatton, who is the managing director of the Earl of Dudley's Round Oak Iron & Steel Works.

METHOD OF MAKING TESTS ON METALS.

BY DR. A. GRADENWITZ.

In a recent communication to the Société d'Encouragement pour l'Industrie Nationale, M. Guillery describes what may be called a novel method for carrying out mechanical tests on metals. The process in question, which is being brought out by the Société Française de Constructions Mécaniques of Denian, France, is remarkable for its simplicity, this being a particularly valuable feature, as the more easily an investigation is performed the more frequently will manufacturers undertake a test of their products.

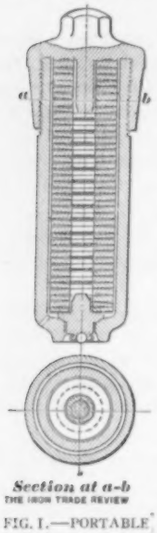


FIG. 1.—PORTABLE APPARATUS FOR TESTING THE HARDNESS OF METALS.

Though in some cases chemical and microscopical analysis will prove a valuable means of ascertaining the condition of a given metal, mechanical methods are to be applied in the first place, and as pointed out by M. Guillery, an efficient test should not only give accurate information as to the properties of the metal, but these data should be maintained in an unmistakable shape, that is quite independent of the personal opinion of the experimenter. From experiments carried out by the Société Française it is inferred that in the case of the metals generally used in practice, it is sufficient to investigate the hardness and brittleness, while the elastic limit is interesting only in certain cases and in the first place for special steel.

The outfit designed by M. Guillery is based on the penetration of balls submitted to a constant pressure on the surface of the metal. This will give the elastic strength, while the elastic limit is determined by means of the indentation of a polished surface of the metal, and for the brittleness, the flection of notched bars under impact is relied upon.

According to actual practice, hardness is generally determined by testing the tensile strength, while a number of additional tests relating to the elongation, bending, impact, etc., are frequently required. All of these tests are however insufficient by themselves to give any positive indication, and can guide the experimenter only in some way or other. Hardness as determined by tensile tests is a rather imperfect definition of this property, as the effect of contraction which makes itself felt at the moment of breaking is not taken into account. There is further a marked difference in the determination of tensile resistance, according to the dimensions, shape, etc., of the test bars.

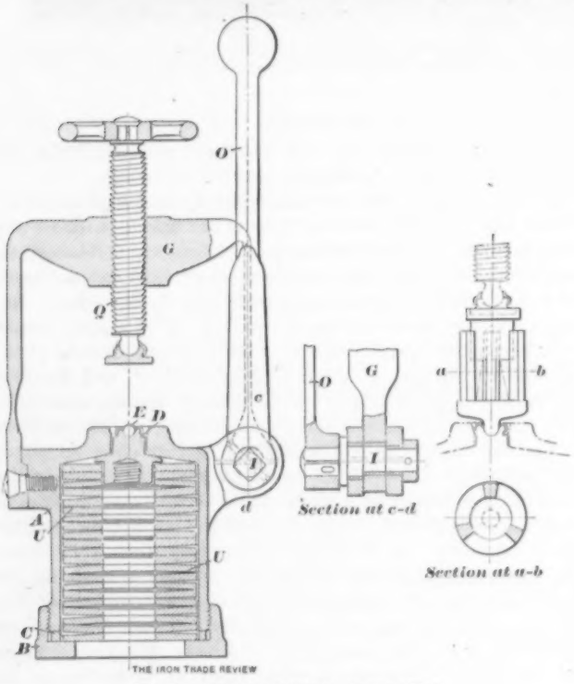


FIG. 2.—THE PRECISION APPARATUS.

Tests on the penetration of balls are on the contrary truly characteristic of the hardness of a metal, giving as they do a homogeneous result, independently of any factors controlling the behavior of tensile strength. This process suggested by Mr. Brinell has a further advantage in that the only necessary preparation is a rough polishing of some square centimeters of the surface of the sample, and a very valuable feature is the fact that tests instead of being limited to separate samples can be applied immediately to the piece concerned, in as many places as desired.

The determination of brittleness by the impact of notched bars is no doubt the most perfect process, being based on the determination of the work absorbed by the fracture. As regards the shape of the notches nothing definite need be stated and any desired form can be adopted in connection with the apparatus described by M. Guillery. Square test bars, 10 sq. mm. (.155 sq. in.) in cross section with notches 2 mm. (.0787 in.) deep are however recommended. The metal is indented by a ball pressed against its surface by means of Belleville discs under a given compression. Two types of apparatus have been designed, one of which, being portable, enables any error of magnitude to be detected very rapidly, without however affording a sufficient means of checking the investigation of the metal. The other apparatus is in instrument of precision, which while not being carried about as easily, does not either require any considerable amount of space. This latter appartus is a very convenient outfit for tests on delivery and for research work.

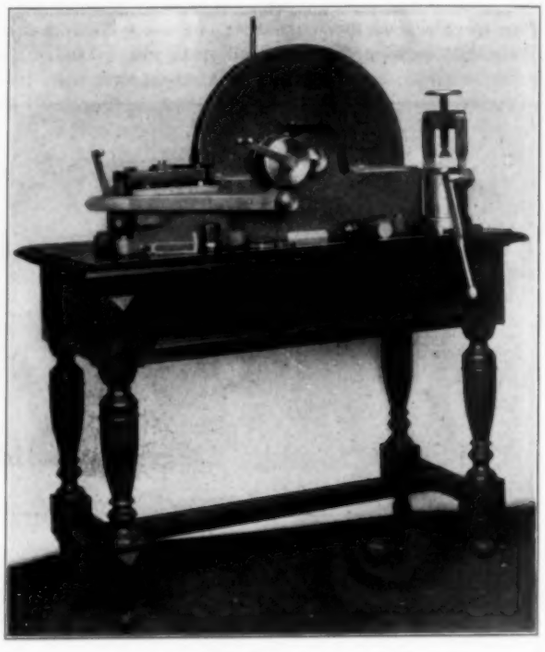


FIG. 3.—MACHINE FOR TESTING FRAGILITY.

The portable apparatus shown in Fig. 1, is designed for balls 5 mm. (.197 in.) in diameter. It is fitted with a head, to which a blow is applied, so as to give the pressure required (750 kgs. or 1,650 lb.) without requiring any resting point. The excess of live force is absorbed by a circular stop, striking the test piece as soon as the load required has been obtained. A similar apparatus has been constructed for

balls 10 mm. (.394 in.) in diameter with loads of about 3,000 kgs. (6,600 lb.). This apparatus seems to be especially adapted for measuring the hardness of metal raised to fairly high temperatures.

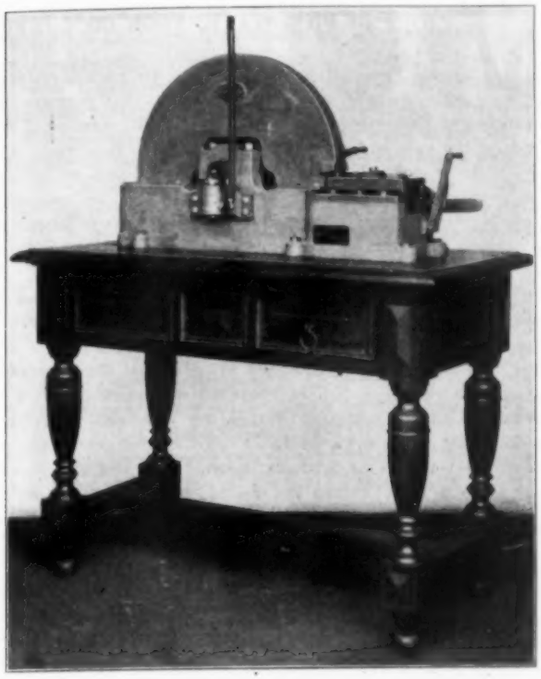


FIG. 4.—ANOTHER VIEW OF MACHINE SEEN IN FIG. 3.

The precision apparatus seen in Fig. 2 is designed for a statical pressure. It comprises a cylindrical steel box A screwed on a foundation socket B containing the Belleville discs U and a regulating packing disc C. The pressure of the disc is transmitted to the ball E by means of a support D. On the top there is a lever press serving to compress the sample on the ball until the load being sufficient the discs will collapse and the ball escape. This press consists of a stirrup G, fitted with a regulating screw Q and which serves to transmit the strain; as soon as contact is produced the tightening of the screw has to be discontinued. One of the ends of the stirrup G is connected to an eccentric axle I, driven by the lever O. The eccentricity is 1.5 mm. (.059 in.), so that by moving the lever through 180 degrees the sample is indented by that amount. Calibration is carried out, as in the case of a tensile testing machine, by means of a metal of known hardness. The apparatus using 10 mm. (.394 in.) balls is adjusted so as to make an impression of 7 mm. (.276 in.) in the rings. The bronze used at the mint for medals seems to give the most reliable results for calibration purposes. Comparative tests have been made on the figures given by tensile testing machines on one hand and by the present apparatus on the other. Up to 64 kgs. the test pieces were made of annealed steel of increasing hardness, while the last two are of tempered spring steel. The diameter of the imprints were measured by means of the Le Chatelier glass gauge, allowing of 1-10 millimeter (4-1000 in.) being safely estimated with the naked eye. (The gauge here mentioned is probably a strip of glass ruled with two slightly converging lines. These are graduated to correspond with the distance the two lines are separated at any point. The strip being placed over any indentation or whatever is to be measured and the position of the glass adjusted until the object just bridges the interval spaced by the graduated lines, the diameter may be read off from the scale).

The apparatus just described is without any previous alteration immediately suitable for ascertaining the elastic limit, it being sufficient to insert in a threaded link, located under the screw of the apparatus frustums of polished cones, subjecting them to a maximum constant load, when the elastic limit is inferred from the ratio of the deformed cross section with the load.

The apparatus for determining brittleness (Figs. 3 and 4) utilizes a flywheel, which on being started at a convenient speed produces the fracture of the test bar. The resulting variation of live force is shown by the diminution in speed through a direct reading. A steel flywheel B (Fig. 5), being perfectly balanced, carries on its rim the knife edge that breaks the sample. The axle of the flywheel rests in two ball bearings, and at the instant of impact, it is borne on surfaces of ample area. The flywheel is regulated either mechanically or by hand to a speed such that the energy stored in the mass will be greater than that which in all cases is required to break the bar, and the speed of impact equal to that adopted in the brittleness test, that is corresponding to a free fall through 4 mm. (.157 in.). A cylindrical clutch the movable element of which is mounted on the lever serves to regulate the drive. This lever, being generally hooked to the frame, is made to engage the clutch on being released, when the flywheel begins gradually turning round up to the normal speed either under the action of the hand on a crank or in virtue of a rope transmission acting on the gooved pulley. The notched bar is placed between bearings on a sliding anvil. This anvil which is of cast steel, carries a plate of hardened steel turned towards the blow; a spring of sufficient strength always tends to move the anvil towards the wheel, that is into the position where it will receive a blow. The mechanism locating the test piece under the knife edge in due season is a cam fixed on a rod, controlling it with a rotary movement, but traversing it freely in the direction of the axis. This rod terminates in a latch worked by a spring, which tends to keep the cam in gear and places the lever in front of the operator. When by the aid of the lever placed in front of the apparatus the anvil is pulled towards the operator, the spring throws the cam into gear and the latch becomes horizontal. When the lever is pushed, the rod is displaced and the latch receives a blow from the knife edge, which throws the cam out of gear and leaves the anvil to the influence of the spring, this action being instantaneous. After the knife edge has made one complete revolution it strikes the test bar.

The speed and the work absorbed are given at any moment by a tachometer, consisting of a small centrifugal pump on

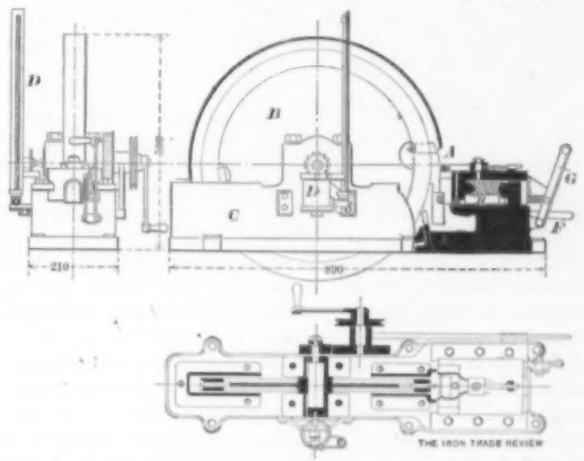


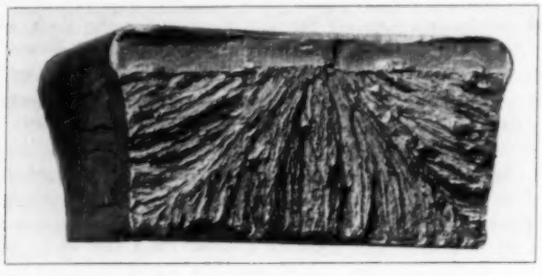
FIG. 5.—ELEVATIONS AND PLAN OF THE TESTING MACHINE.

a vertical axis. This is fitted with a graduated water level gauge. A safety mechanism renders it impossible to insert the test bar when the anvil is out of gear. The flywheel is covered by an iron case, protecting it against the risk of striking any projection.

A NEW ANTI-FRICTION ALLOY.

An novel feature in the line of an anti-friction metal, is shown in the halftone. The particular point of interest lies in the peculiarity of crystallization, which forms the chief basis of claims made by its producers. The piece of metal shown has been nicked on one side, and after being gripped in a vise has been broken off by a sharp blow from a heavy hammer. This operation reveals a fibrous, stringy mass. The crystals, it will be seen, extend perpendicularly to the chilling surfaces. The alloy is of tin and aluminum base and a remarkable characteristic is that the fibers always radiate from the chilling surfaces, regardless of the number of times the metal is reheated, thereby presenting the ends and not the sides of the fiber to the sliding friction surface.

It is understood that in the case of wood and of wrought iron the surface exposing the ends of the fiber will stand a greater amount of crushing weight and wear than the sides of the material. It was on this principle and its exhibition in an alloy that the metallurgist who produced this metal worked. His efforts extended over a period of twenty years. To prove the soundness of the theory of resistance to wear the composition was given many severe tests which were in all instances gratifying. Its great toughness and malleability combined, it is claimed, permits it to withstand the most severe shocks without becoming brittle or what is ordinarily called "crystallized." A close examination of the fractured surfaces shows it to be of so fine and smooth a texture, with



ILLUSTRATING FRACTURE OF A NEW ANTI-FRICTION ALLOY.

no granular matter intervening, that it may be said to be a truly chemical compound.

Users of anti-friction metals experience difficulty in remelting and reusing them, owing to the grosser metals—those which melt at the lowest point—volatilizing and escaping, leaving the composition harder with each pouring. The producers of this metal say they have entirely overcome this and that by a perfect combination of metals have secured an alloy which, it might be said, has produced—not a new composition—but an entirely new metal in itself that will admit of remelting an indefinite number of times without becoming hard or harsh or losing any of its original properties.

The characteristics of this metal make it particularly desirable for use in linings of driving box and engine truck brasses, eccentric straps, cross head gibs, steam and gas engine bearings, ships bearings, wood working and other kinds of high speed machinery.

The Buda Foundry & Mfg. Co., of Chicago, will place this metal on the market, together with some new bronzes and a copper-steel composition, the latter being called a rediscovery of the art of copper hardening. This new departure of the Buda Foundry & Mfg Co., whose output heretofore has been largely confined to track supplies, will be made an important branch of its trade, but will not interfere with the business in railroad specialties.

"We were attracted to these metals," said Mr. H. K. Gilbert, secretary of the Buda Company, "by the exceptional merits which they possess. Thorough tests have convinced us that we have in them, something which will be an agreeable surprise to users of anti-friction alloys, and that they will create a great demand for themselves." The company is sending out samples to interested persons.

CHICAGO PNEUMATIC TOOL CO.

The Chicago Pneumatic Tool Co. has declared a quarterly dividend of 1 percent, payable April 10. This concern was organized in December, 1901, and from April, 1962, paid dividends at the rate of 6 percent yearly until January, 1904, when they were stopped. The declaration of the present dividend was supplemented by an official statement that the resumption of disbursements was fully warranted by the large increase in earnings. The gain in the volume of business, it is reported, is equal to 77 percent, as contrasted with a year ago. According to President Duntley more orders are now on the books than at any previous time since the company was organized. Both the foreign and domestic demand for the company's products is now active and the plants of the corporation are in full operation. The financial statement covering the operations of the company during the year 1904 will not be made public for a week or two. The annual report for 1903 showed net profits of $701,464, against $897,059 the previous year. To a large extent the falling off in business in 1903 was attributed to the many differences between employes and employers. The executive committee includes Charles M. Schwab, J. W. Duntley and J. R. McGinley. Besides these men the directors include A. W. Maconachie, London, England; James Tarte, London, England; C. H. Matthiessen and W. B. Dickson, New York; James Boyer, Detroit; and W. O. Duntley, New York.

Steel Rail Prices at Home and Abroad.

That our steel rail manufacturers are not charging our railroad companies excessive prices for the rails they sell to them is shown by a comparison of their prices with the prices charged by English rail manufacturers to their customers in the last few years. Here is a little table that we compile from data of undoubted authority giving the average annual prices of steel rails in our own country and in England from 1895 to 1903. For the latter country the figures have been furnished to us by the British Iron Trade Association. For our own country the prices given are taken from the records of the American Iron and Steel Association.

United States.		England.	
Years.	Average Prices.	Years.	Average Prices.
1895	$24.33	1895	$21.89
1896	28.00	1896	21.69
1897	18.75	1897	23.35
1898	17.62	1898	23.49
1899	28.12	1899	26.80
1900	32.29	1900	36.01
1901	27.33	1901	29.45
1902	28.00	1902	27.37
1903	28.00	1903	27.97

Prices for 1904 are not given in the above table because we have not yet received from the British Iron Trade Association the average price of steel rails in England in that year, but quotations in *Ryland's Iron Trade Circular*, of Birmingham, indicate that the average price was about $26.64 per ton. In our own country the price throughout 1904 was $28. This is the present price. The present price in England is £5 to £5 2s. 6d., or a little less than $25, as we learn from the London *Iron and Coal Trades Review.—Bulletin of the American Iron and Steel Association.*

The officials of the leading railway equipment companies estimate that the business booked this year by the various companies aggregate about $150,000,000. This amount will be considerably increased as prospective orders are received. The Chicago railroad men estimate that orders amount to $200,000,000. The estimate of the railroad officials, however, is for the year 1905, while the estimate of the car companies' officials represents business so far booked this year.

SLOSS-SHEFFIELD STEEL & IRON CO.

At the annual meeting of the Sloss-Sheffield Steel & Iron Co., held last week, Major James Dooley, of Richmond, was elected a member of the board, succeeding J. H. Plummer, of Toronto, whose ill health makes it necessary for him to lessen his business engagements. Wm. E. Strong, of Strong, Sturges & Co., and now a director, was elected a member of the executive committee, succeeding Robt. R. Van Cortlandt. There were no other changes. The retiring officers were re-elected.

The annual report, of which a brief summary was published in these columns last week, shows the effect of the depression in the pig iron market during the greater part of 1904 and also the coal strike, but the improvement in trade conditions in the closing months covered by the report enabled the company to clear its preferred dividend by the sum of $14,637. These figures compare with a surplus in the previous year of $1,116,641, or a decrease of $1,102,003. The profit on pig iron after allowing for depreciations on iron ore and 25c per ton on iron for extraordinary repairs foots up $303,093, a drop of $836,053. Net earnings were smaller by $1,102,004.

In his report, President Maben says:

"The fiscal year of your company which ended Nov. 30, 1904, was in some respects one of the most disappointing and trying in the history of the company. Notwithstanding the fact that the country was overflowing with wealth; that prosperity was widespread, and the balance of the foreign trade was largely in favor of this country, the year opened with a weak and declining iron market, with the price of No. 2 Foundry close to $9 and, despite several feeble efforts to advance the price, remained about this figure for nine months, so the profits of the company from pig iron were based upon deliveries for the entire year at an average price of only a fraction above $9, against an average price for the previous four years of $12.55. Had this average of $12.55 been maintained last year, the profit on iron for the year, owing to increased output and decreased cost, would have been $1,600,000 against $1,139,146 the previous year when the price of iron delivered averaged $13.66. The low price of iron caused the closing down of over 40 percent. of the furnaces of the country, but none of your furnaces were 'blown out' at any time, except for needed repairs. While these low prices for iron were prevailing, a strike at many of our most important coking coal mines was instituted, on the first of July, by the United Mine Workers—as with all other furnace companies of the district, except one which signed the previous year's scale—and continued throughout the year. For two months these mines were practically not operated at all, but were finally opened up on the 'open shop' basis and have so continued to be worked, the output showing a gradual increase, though not yet back to normal. While this strike has been expensive and in many ways trying, the ability of the company to control its own business, must inure greatly to its benefit in the future. Notwithstanding this strike which existed five months of the fiscal year, we succeeded in keeping all six of the furnaces owned wholly by the company in blast for the entire period, except No. 1 furnace which was stopped temporarily for repairs and is again at work, and the make of iron exceeded by 71,000 tons; the largest yearly production since the company was organized, against a decrease in production in the state for the year, of 107,885 tons, while the production of coke was within 4,500 tons of the best year. While from the causes enumerated (especially the low price of iron), the earnings for the year were not what we could have wished, there is cause for encouragement and some satisfaction to be found in the fact, that despite the adverse conditions, the earnings were sufficient to pay the usual dividend on the preferred stock; a considerable sum for the improvement of your properties; to add somewhat to the handsome surplus carried over from the previous year, and add $100,000 to working capital, making it now nearly twice the amount originally set apart for that purpose. The present year opened with very different conditions in the iron markets of the country, and with present prices and the accummulation of about 50,000 tons of pig iron carried over from last year, on which no profit has been counted, it is reasonable to believe that the result of business for the year will be entirely satisfactory. The company has no floating debt whatever, and its interest account shows a large credit balance for the year."

Blast Furnaces.

"No. 1 furnace was blown out for repairs Aug. 23, and put to work again on Jan. 25, 1905. It was relined and in every way fully refitted and a new stove and steel cast shed built. All of your furnaces are in good condition, and with a regular supply of coke, which has been somewhat interfered with by the strike of the coal miners, should maintain their best records. A drought of 90 days last fall when for lack of water the operation of our washers at Russellville were seriously interfered with, followed by an unprecedented severe winter, materially reduced the production of brown ore, but the Sheffield and Florence furnaces were kept fully supplied with ore and have been almost steadily in operation, the Hattie Ensley furnace making an increased output for the year of 27 percent, and the Philadelphia furnace of 44 percent. above their previous best year's record. The Lady Ensley furnace, two-thirds of which is owned by your company, was not in blast during the year, as the North Alabama Furnace Co. owned no raw material and the price of iron did not justify the purchase of them."

Coal and Coke.

"The production of coal for the year shows a decrease as compared with that of 1903 of about 100,000 tons, yet still a considerable increase over any year previous to that. The decrease last year was due entirely to the strike of the miners. While the tonnage decreased, the cost also was materially reduced. During the year we began the opening of what is known as 'D' mines at Coalburg. This work is now completed, and the mine will soon be producing coal which should increase our output by about 500 tons a day. Minor improvements have been made at several of your coal mines, the expenditures for which were authorized by your board.

"The condition of your coke ovens has been maintained, but no additional ovens were built during the year. While the production of coke shows a slight falling off as compared with the largest previous year's yield, the cost of producing it was considerably reduced, and the quality in some respects improved."

Iron Ore Mines.

"*Sloss Mines.*—The amount it was necessary to expend at these mines during the past year in order to maintain the output and keep the cost down, was very small. The mines have been very efficiently operated, and the ore produced shows an increase of 123,194 tons as compared with 1903, which year showed the largest previous production, by nearly 100,000 tons, and the cost shows a reduction.

"*Russellville Ore Mines.*—"During the year we built two large ore washers to replace two small ones which were dismantled, and a considerable sum was expended in putting the steam shovels, dinkey engines and other machinery in good repair and a number of additional three-ton side dump tram cars were added to the equipment. Being brown ore mines where it is all open cut mining, the product is seriously affected by the weather, and during the last year an unusual number of troubles and vexations were experienced. There was no rainfall for ninety days in the fall, and the water courses went dry, so that at one time only one of our four washers could be operated. This was followed by one of the severest winters ever known in this region, with the thermometer at times down to zero, and alternate freezing and thawing, rendering it most difficult to operate the plants. There were 236,230 tons of ore shipped during the year, a falling off of 24,309 tons from the previous year. With reason-

able weather these mines should produce more ore than ever before."

Comparison of Outputs.

"As has been the custom heretofore, a comparative statement of the products of the company for several years is given below, in order that the stockholders may see whether or not the company is maintaining its position as a producer:

	1904.	1903.	1902.	1901.
Pig Iron	382,267	311,093	287,685	218,857
Coal	1,400,669	1,501,956	1,287,826	1,042,298
Coke	544,767	549,201	453,054	339,199
Red Ore	500,274	377,080	284,482	221,789
Brown Ore	236,230	260,539	298,700	234,661
Dolomite	83,961	115,635	101,069	101,349

"The above figures of pig iron embraces only the product of six furnaces owned entirely by the company. The decrease in the output of dolomite was due entirely to the lessened requirements of the furnaces, since a larger proportion of hard ore which carries its own flux was used. There was a surplus of dolomite at all times.

"Herewith are presented statements showing resources and liabilities, earnings for the year and of working capital in our business, from which can be ascertained the financial condition of the company. To the officers of the company and its employees, who have been at all times faithful and untiring in the discharge of their duties, especially during the trying period of the strike, our thanks are due."

Working Capital.

The company's working capital compares as follows:

Assets—	1904.	1903.	Decrease.
Cash accounts and bills receivable	$1,344,109	$1,149,192	*$194,917
Raw and finished material on hand	464,998	688,035	223,036
Mdse. and sup. in cos. stores and warehouse	164,939	294,040	129,101
Insurance and taxes unexpired	12,068	17,078	5,010
Treasury secur.	485,761	397,840	*87,921
Total	$2,471,875	$2,546,185	$74,310
Liabilities—			
Bills payable	$.....	$ 176,128	$176,128
Payrolls (current month)	65,104	78,469	13,365
Accounts payable (current business	484,498	469,646	*15,302
Total	$ 550,052	$ 724,243	$174,191
Bal. working capital	$1,921,823	$1,821,942	*$99,881

*Increase.

The condensed balance sheet, as of November 30, follows:

Balance Sheet.

Assets—	1904.	1903.	Decrease.
Property account	$18,375,306	$18,311,417	*$63,880
Treasury securities	259,700	259,700	———
Stocks and bonds others companies	311,995	311,995	.....
Cash accounts and bills receivable	1,344,109	1,149,192	*194,917
Repairs and renew.	147,337	208,548	61,211
Insurance and tax.	12,068	17,078	5,010
Supplies	464,998	790,071	325,073
Stocks in company's store	164,939	192,004	27,065
Total	$21,080,452	$21,240,005	$159,553
Liabilities—			
Preferred stock	$ 6,700,000	$ 6,700,000	.....
Common stock	7,500,000	7,500,000	.....
First mortgage bonds	2,000,000	2,000,000	.....
General mortgage bonds	2,000,000	2,000,000	.....
Current accounts	484,948	469,646	*$15,302
Payroll	65,104	78,469	13,365
Bills payable	.....	176,128	176,128
Profit and loss	2,330,400	2,315,762	*14,638
Total	$21,080,452	$21,240,005	$159,553

*Increase.

Statement of Operations.

The statement of operations for the year ended Nov. 30 follows:

	1904.	1903.	Decrease.
Profit on pig iron	†$303,093	$1,139,146	$ 836,053
Profit on coal	‡185,444	216,265	30,821
Profit on coke	155,295	175,962	20,667
Ore and dolomite sales	392	64,343	63,951
Rents, stores, etc.	154,170	208,939	54,769
Total	$798,394	$1,804,655	$1,006,261
No. Ala. Furnace Co. loss	27,027	gain 58,388	*85,415
Total profits	$771,367	$1,863,043	$1,091,676
Ex. tax and license	77,730	67,402	*10,328
Net earnings	$693,637	$1,795,641	$1,102,004
Bond interest	210,000	210,000	.....
Balance	$483,637	$1,585,641	$1,102,004
Dividends preferred	469,000	469,000	.....
Surplus	$ 14,637	$1,116,641	$1,102,003
Previous surplus	2,315,762	1,199,121	*1,116,641
Total surplus	$2,330,399	$2,315,762	*$14,637

*Increase. †After deducting the depreciation on iron ore and 25c per ton on iron for extraordinary repairs. ‡After deducting for depreciation.

Mackenzie & Mann, Toronto, have purchased 20,000 tons of English rails for the James Bay railway. Delivery is to be in amounts of 4,500 tons per month in May, June, July and August, and the remainder in September. The order was placed with Bolckow, Vaughan & Co., of Middlesborough, England. The rails are to be imported because the Canadian mills will be unable to supply them on such short deliveries.

The partnership existing between George Best and B. K. Elliott, doing business as the Elliott Electric Blue Print Co., Pittsburg, has been dissolved by the sale of the property and business to the B. K. Elliott Co. This company deals in blue printing machines, blue printing material and drawing material and instruments.

Extensive improvements are to be made at the Sharon, Pa., plant of the American Steel Foundries Co. The melting capacity is to be increased by the addition of a 25-ton open-hearth furnace, while a new machine shop will be built to facilitate the machining of the castings. In addition the cleaning room will be extended and two additional traveling cranes will be installed.

The Amsler Engineering Co., Pittsburg, has been awarded the contract for the excavations and foundations for the new plant of the Crescent Forgings Co., to be erected near Pittsburg. There are four large buildings included in the specifications, including boiler and engine house, forge shop, machine shop, warehouse, as well as a crane runway for handling the product.

By a decision of the referee in bankruptcy the Girard Iron Co., Pittsburg is only allowed $7,773 on a preferred claim secured by a mortgage and $29,020 on an unsecured claim on a contested claim totaling $115,000, against the defunct Continental Iron Co., of Wheatland, Pa. This decision, handed down at Warren, O., this week will greatly increase the amounts to be allotted the other creditors of the company.

Hugh McMillan and others, of Detroit, have placed an order with the American Shipbuilding Co. for the construction of a new freighter to go into commission on the lakes at the opening of navigation for the season of 1906. The new boat will be 500 ft. over all, and will be a duplicate of the steamer Ball Bros., recently launched for the Tomlinson interests at the Lorain plant of the American Shipbuilding Co.

System of Hot Feed Water for Stationary Boilers and Shop Heating.*

By A. A. Maver.

Some three years ago at the locomotive works of the Grand Trunk Railway, at Montreal, on account of a shortage of steam supply, due to increased demands, a system was inaugurated of conveying the exhaust steam from the stationary engines, steam hammers, and pumps to condensers from which the water flows into hot wells and is then pumped through superheaters and delivered to the boilers at a temperature near boiling point. Formerly the water was delivered by injectors at a temperature of about 65 degrees, but on account of the greatly increased temperature, due to the use of this waste heat, the results were such that instead of a steam shortage, although forcing every boiler to the extreme limit, we were enabled to shut down several and yet maintain a satisfactory pressure. By an approximate rule for the conditions of ordinary practice, a saving of 1 percent is made by each increase of 11 degrees in the temperature of the feed water, and, according to this rule, the saving in fuel is about 13 percent, with a still further inclination to save due to less fuel handled, boiler attendance etc.

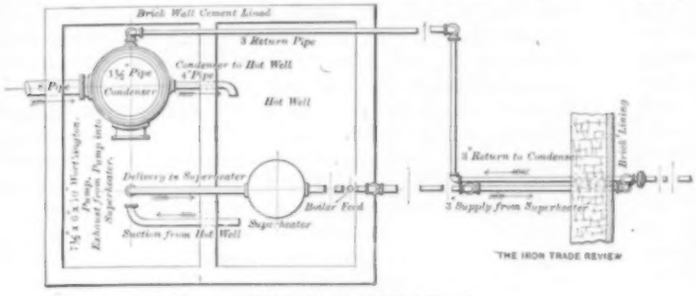


FIG. 1.—DIAGRAM OF CONNECTIONS.

The system as we have it in operation at Montreal is shown on the diagram, Fig. 1. To the left is shown an 8-in. cast iron receiver pipe A, which conveys the exhaust steam from the stationary engines, steam hammers, etc., each engine or hammer having its exhaust pipe coupled to this receiver by means of a Y connection B, having a 4-in. branch which, by means of a reducer, can be coupled to any size of exhaust pipe. At our blacksmith shop one of these receiver pipes runs the entire length of the shop, about a foot below the ground surface having 12 connections from engines and hammers, and discharge into a jet condenser C. Inside of this condenser there is a funnel-shaped plate with a center opening about 10-in. diameter just above the manhole. Jets of cold water are arranged to play upon this plate, condensing the steam as it comes in contact with the plate and cold water. A few inches below the manhole, a circular angle iron supports a bed of charcoal, carried on a perforated plate, the charcoal being covered with a fine copper mesh, which is cleaned at regular intervals. This is for the purpose of separating impurities from the water of condensation, which then flows through the purifying bed to the bottom of the condenser and thence to the hot well. The exhaust from one of our large engines is passed in at the bottom of superheater D, and thence to the condenser by pipe E. The pump is set in a pit as low as the bottom of the well from which the water flows by gravity to the pump, and having therefore no suction duty to perform, it simply forces the hot water through the superheater and thence to the boilers. It frequently happens that the exhaust steam comes into the condenser in greater volume than it pays to condense it all, and when the floating indicator in the well shows that the hot water is about to flow over and go to waste in the drain, the condensing water is cut off and the uncondensed steam passes out at the top of the condenser to the atmosphere by means of the 10-in. galvanized pipe F.

Aside from the saving effected by capturing and utilizing this waste heat, which used to escape by numerous pipes through the roofs, presenting a very unsightly appearance, we eliminate to a large extent the trouble we formerly experienced during the winter season, caused by icicles forming along the eaves, particularly by condensation thrown from steam hammers; these icicles obscured the light and were often the cause of broken windows when they fell; but since the disappearance of the exhaust steam the shop externally presents a clean, tidy appearance, in marked contrast with its former appearance, especially during the winter season.

After the system which has just been described had been in operation for some months it occurred to the writer that as we had such an abundance of hot water, it might advantageously be used for heating purposes, and accordingly it was decided to connect one of our hot feed water pumps to the existing system of hot water radiators in the motive power offices, which has hitherto been heated by a furnace in the basement and annually consumed some 70 tons of anthracite coal, besides all the attendant work in connection with the furnace, handling of coal, ashes, and dirt, and dust throughout the building. This building is 60 ft. by 60 ft. with four floors and a basement and stands isolated about 200 yards from the works.

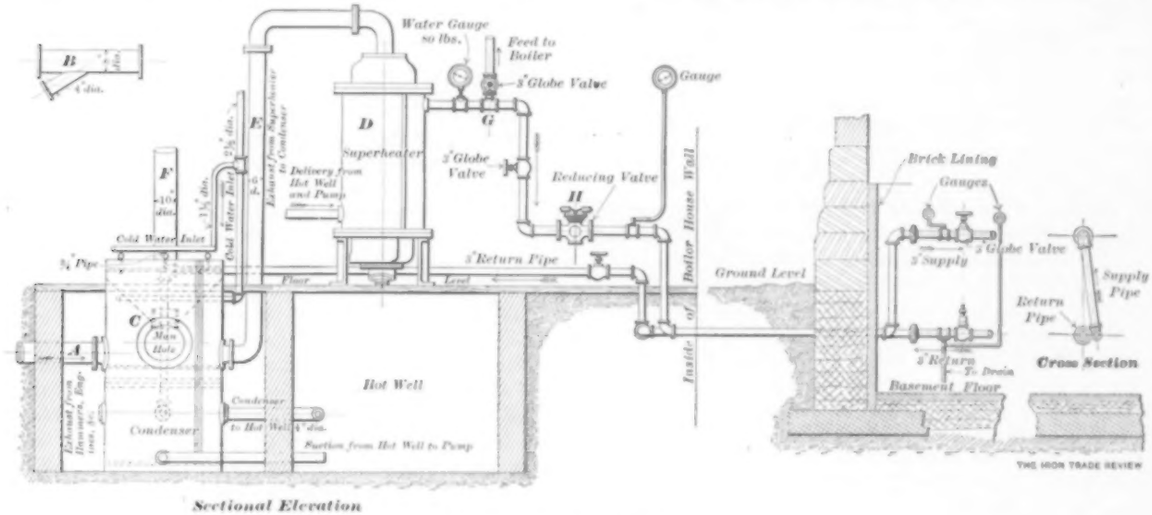


FIG 2.—DETAILS OF PIPING.

*Read at a recent meeting of the Canadian Railroad Club. Mr. Maver is master mechanic of the Grand Trunk Railroad shops at Montreal.

The connection, see Fig. 2, was made by putting a tee fitting G on the feed pipe to boilers and beyond this a reducing valve H was attached to reduce the pressure. A 3-in. flow pipe and 3-in. return pipe were laid in a box about a foot below the ground level. On the return pipe a valve J was placed to regulate the return water, which requires to be faster when the temperature is low. A retaining valve having a spring screwed down to resist a pressure of some 15 pounds greater than the head of water in the building was put on the return pipe at a convenient point between the regulating valve and the condenser. The object of this retaining valve is to ensure the whole system being kept full and under pressure, thereby preventing air being drawn in. When this building was heated by the basement furnace frequent complaints were made about low temperature during severe cold weather, but the water now pumped through the radiators is so much higher in temperature that 75 degrees can be steadily maintained during zero weather.

The results were so satisfactory in every way that it was decided, that the Railroad Y. M. C. A. building, which was under construction, should be heated in a similar manner. This building is situated across the street from the motive

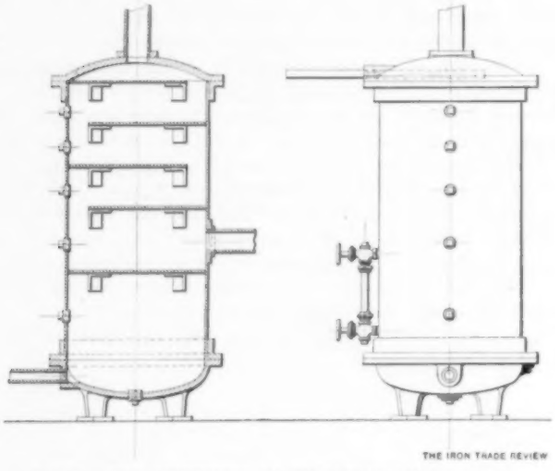


FIG. 3.—THE CONDENSER IN ELEVATION AND SECTION.

power offices and is about 150 ft. long by about 50 ft. wide, and has three floors and a basement.

The heating system of this building is connected to the same 3-in. pipe which conveys hot water to the motive power offices; but on entering the building it discharges into a 5-in. pipe, and about the center of the building this pipe rises vertically, carrying the water to the ceiling of the top floor, where it discharges into a 4-in. pipe which runs the entire length of the ceiling, having a number of 2½-in. branches on either side running to the side walls and dropping to the radiators of each floor, finally discharging into the return pipe in the basement and is conveyed back to the condenser. An additional pump was installed on account of the increased duty and they are connected so that if one of them is under repairs the other will keep up the circulation.

This arrangement has given satisfactory service during the past two severe winters. It differs from that of the motive power offices, where the water is forced upward through the radiators, it being thought that the downward flow through the radiators would perhaps be better adapted for this forcing system, but experience has shown that they are equally satisfactory. By this scheme the Railroad Y. M. C. A., was relieved of the expense of installing heating furnaces, and also the much greater expense of providing fuel annually for heating purposes. The new Railroad Y. M. C. A. building at Stratford is similarly heated from the works. In the absence of exhaust steam, when the works are closed the well is heated by live steam.

A large portion of the Montreal works is now heated by this method, which is being gradually adopted throughout the system for workshops and roundhouses, with certain modifications to meet local conditions. Where the supply of exhaust steam is limited the condenser is dispensed with. Within the past year or two, five new roundhouses have been built at various points on the system which are very satisfactorily heated in the following manner.

The exhaust from the stationary engine, air compressor, and pump are passed through the superheater and thence direct into the hot well; the water is then pumped through the superheater, and after circulating through the heating coils returns to the well. Steam blown from locomotives is discharged direct into the well. The temperature of these roundhouses is such that engines are soon thawed out, permitting of necessary repairs and cleaning being done; and in addition to this, the house being comfortable and warm, the whole roundhouse staff render more efficient service then when working in discomfort, and the engineers and firemen are attracted to spend their spare time working about their engines, as is the custom with many during the summer, but which only the most faithful and devoted will do in a cold and draughty building.

We have a pumping station at the river bank for supplying water to the works, where formerly the feed water for the boilers was delivered at river temperature, but since the installation of a condenser, shown as Fig. 3, a saving has been effected of about 17 per cent. in fuel.

Allis-Chalmers Co.

At a recent meeting of the board of directors of the Allis-Chalmers Co., held in New York, it was decided to concentrate its commercial and engineering departments at Milwaukee, Wis., where the company's principal works are located. The general offices of the company, which have been located in the New York Life Bldg., Chicago, will consequently be moved by May 1 to Milwaukee. The change contemplates the removal of the offices of the vice-president, general manager, comptroller, assistant comptroller, assistant treasurer, office counsel, accounting and credit departments. A district sales office will be maintained in Chicago, which will be located after April 15 on the 15th floor of the First National Bank Bldg.

A folio publication by Welbanks, Crandall & Co., of Duluth, under the title, "Minnesota Iron Mines," presents a series of excellent photographic reproductions illustrating the marvelous resources of Minnesota in iron ore. The half tone engravings are of the most famous open-pit and underground iron properties of the state and give an idea of the vast scale of operations at these mines. Some of the views are full page 7½ x 9½-in. plates, while others open up across two pages. The work is an unusual combination of photographer's and engraver's skill. There are also views of the docks at Duluth, of the Zenith Furnace Co.'s properties and of St. Louis river and its falls. The introduction, "Minnesota as a Mining State," is by Dwight E. Woodbridge. The cover design introduces the steam shovels of the open-cut mines and the timbering of underground mines. The photographs are by R. S. Crandall, of Duluth.

The fifth annual session of the Summer School for Artisans held under the direction of the College of Engineering of the University of Wisconsin, begins at Madison, Wis., June 26, and continues for six weeks. Courses of study are offered in five subjects: Shop work, engines and boilers, applied electricity, mechanical drawing and machine design, and lastly, materials of construction, fuels and lubricants.

In mention of the work of Duncan Symington in our issue of last week it was stated that he had been connected with the Northern Engineering Works of Detroit. It is now learned that this statement was erroneous.

Some New Things for the Shop, Chiefly by Way of the Patent Office.

Rawhide Bearings.

Edgar T. Shepard, secretary and manager of the Oneida Steel Pulley Co., of Oneida, N. Y., has patented a method of making rawhide sleeves for use as bushings or bearings in loose pulleys, hangers, etc. The inventor produces "a sleeve or bushing from a continuous strip of rawhide, which is wound spirally to form a cylinder of the desired diameter and has its helices adhesively secured together under pressure, whereby the waste of material, labor and cost of the completed article are reduced to a minimum. One advantage of this spiral continuity of the strip is that the fiber or grain of the rawhide is allowed to remain in its natural state, thus retaining its original tenacity or toughness and presenting an unbroken bearing in the direction of rotation of the revolving part to which it is applied."

Fig. 1 is a perspective view of a bushing and shows some of the helices extended. Fig. 2 is a sectional view through a finished bushing and indicates by dotted lines the means for pressing the helices together. The bushing is forced from a continuous strip of rawhide A, each strip being cut from the hide without waste and is then wound spirally upon a form as at B. This is of sufficient length to form a number of helices and to the adjacent sides of these coils is applied glue or cement. The form or press B has shoulders and a nut to compress the rawhide helices tightly together after they are wound, the winding being performed with the strip under tension. It is claimed that by making the bushing from a continuous strip the usual waste of material and labor in forming it of laminations is avoided and that the continuity of the strip in the direction of rotation of the part to which it may be applied affords greater tenacity and reduces the liability of disintegration or segregation under torsional strains.

A letter just to hand from the Oneida Steel Pulley Co. contains the following: "Rawhide has been used as a bushing for ten or fifteen years, but it is not generally known throughout the country that it is the best wearing material for that purpose which has been found. There are bushings running now in the Straight Line Engine Co., of Syracuse, which Prof. Sweet had put there about ten years ago, and which are apparently as good as they were when they were put in and are running without oil. Manufacturers will understand what that means in loose pulleys. In fact the shaft will wear out before

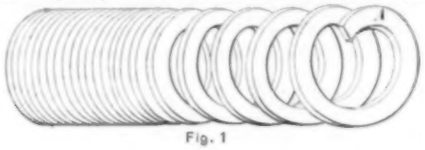


Fig. 1

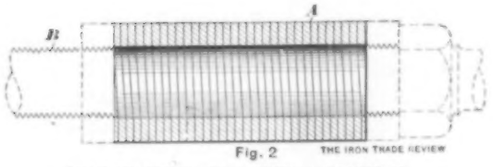


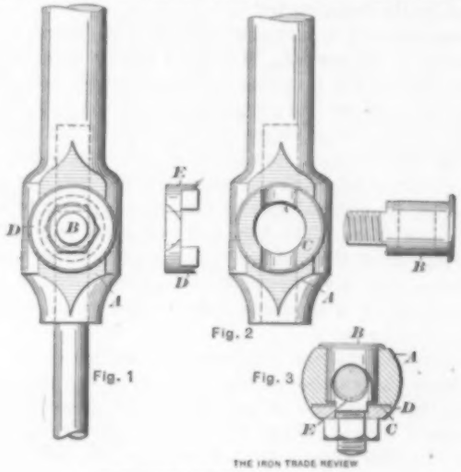
Fig. 2 THE IRON TRADE REVIEW

MANUFACTURE OF RAWHIDE BEARINGS.

the rawhide will in every instance where it has been tried out. The idea of the new patent is to build the bushing in such a way that it can be made at a reasonable cost either in a split or solid bushing. It can also be used in hangers, pillow blocks, etc., where there is not too heavy a load. There is also less friction than there is in a babbitted bearing, as rawhide, properly prepared, is a natural lubricant We expect shortly to have these ready for the market."

A Drill Chuck.

This device has been patented by Robert Binnie, of the Binnie Electric Drill & Machinery Co., of Bolivar, Pa. The company uses the chuck on its mining drills and says that "the crystallization due to hard shocks in drilling rock is greatly moderated." The inventor avers that the chuck can be em-



THE DRILL CHUCK IN DETAIL.

ployed in drill press work and "will take all sizes of drills by the use of a perforated sleeve to allow the retaining lugs to pass through and engage the drill in the center of the bore."

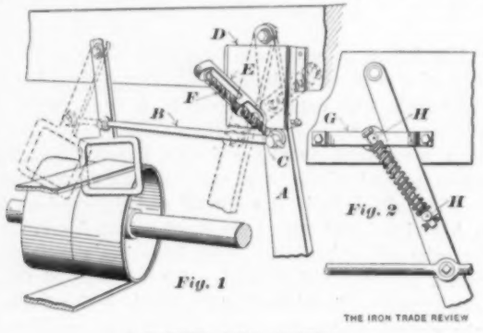
Fig. 1 is an elevation of the device, Fig. 2 shows the parts disconnected and Fig. 3 is a cross section of the assembled parts. The chuck body is enlarged and flattened at one end as at A and is bored out to receive the drill shank. A recess in the enlarged part of the chuck body has a curved side in alignment with a circular opening for the head of the bolt B and the opposite side of the body has a deep circular seat at C for the clamping ring D. This ring has an opening for the bolt B and is retained in place like an ordinary washer under the nut. The ring D has on each side of the bolt lugs with gripping surfaces E curved to partially surround the drill shank. These lugs are toothed or serrated to grip the drill. The bolt B is flattened on opposite sides to accommodate the lugs and has an opening also for the drill shank. The drill shank projects through the opening in the bolt and when the clamping ring is forced inwards by the nut, the drill is clamped by the lugs and centered.

A Belt Shifter.

A creeping belt is an abomination from every point of view. The belt is thrown on the loose pulley but it does not stay there. It creeps along towards the fast pulley and then the belt rubs against the rim with an irritating squeak. The swinging belt surges slightly at intervals and the squeal sounds in unison with the belt—and that alone. Left undisturbed the belt drags wearily onto the fast pulley and in time may start up the machine. A notch or a nail in the belt shifter and a length of cord may serve to hold the lever toward the lathe tailstock or whatever may be the off belt position. This is by no means a cure and the belt rubs hard against the fork or eye as the case may be and with the uneven pressure rattles harshly about the countershaft. Nothing for the trouble but a careful examination of the belt and the pulleys and probably lining up the countershaft—always a disagreeable job and likely enough it is imminent when business otherwise is very brisk. The squealing belt is but a symptom of a shop ailment calling

insistently for cure and the symptom therefore has value. A belt is likely to go from the tight to the loose pulley for a similar reason to the one already suggested, but the string expedient is clumsy for any more than a very temporary purpose and there is also a danger where the belt shifter is locked by a knotted cord inadvertently. There are places where a belt shifter can properly be locked in position. The drawing frames used in textile mills are so equipped. The breaking of a cotton strand releases a trigger and the belt shifter promptly passes by spring pressure to the limit of its stroke and stays there, notwithstanding the pressure in the opposite direction exerted by the dragging belt.

A simple device for a similar end has been patented by John H. Moore, of Hoopeston, Ill. Fig. 1 is a view in perspective of one form of the invention. This shows the belt shifter in position to hold the belt on one of the pulleys and also shows in dotted lines the position of the parts of the belt shifter after the belt has been transferred to the other pulley. Fig. 2 is an elevation of another though slightly different form of the device, the pulleys and the belt engaging arm being omitted to save space. The belt, fast and loose pulleys and the timbering about the countershaft are of familiar type. The belt shifter arm A is pivoted to the overhead timbers and has a connecting rod B and this is linked to the stud C which turns freely. The swing of A is limited by a casing D and this has setscrews for adjusting the throw. A tension device, in Fig. 1, includes the member E having a lug at the free end with an opening for the rod F, and another lug nearer the pivoted end with a larger opening for both rod and spring F. The spring is coiled around the rod and has its ends in engage-



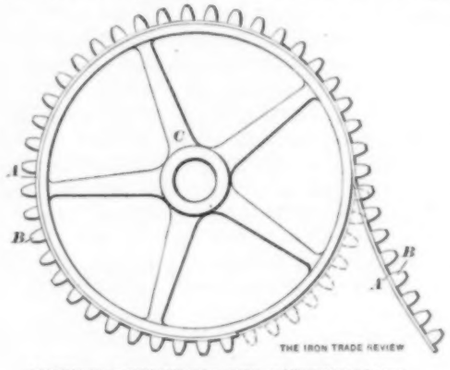
A PATENT BELT SHIFTER.

ment with the lug and the stud C respectively. Cotter pins through the ends of the rod hold it in position as it serves to keep the spring in alignment with the lugs. The rod also swings the pivoted member from the position shown in solid lines to the one indicated by the dotted lines and vice versa as the belt is shifted. The tension of the spring must be sufficient to hold the shifter at the end of its throw, but any increase beyond this amount will oppose a needless resistance to the movement.

In Fig. 2 the stroke of the belt shifter is limited by a guide G. This a metal strap bent to form a loop. Studs H H are mounted midway between the ends of the loop G, and between the pivot of the shifter lever and the stud of the connecting rod. These studs H H are drilled for a rod having a compression spring somewhat similar to the arrangement seen in Fig. 1. The swing of the rod in either direction is opposed by the compression of the spring. After passing the middle point of the swing the movement of the lever is assisted by the expansion of the spring and when the lever reaches either limit of its travel it will be held there until forcibly drawn against the spring tension.

The Making of Gear Patterns.

The object of this invention as it appears to the patentee, Theodore W. Lowe, of Stockton, Cal., "is to provide a new and improved pattern for casting gear-wheels and gear-racks arranged to permit the formation of gear-wheel patterns of any desired diameter, shape of teeth, pitch, etc., to insure casting of properly meshing gear-wheels in a very simple and economical manner and without the use of the expensive gear-wheel patterns now employed." The illustration shows a flexible strip with gear teeth as applied to the wheel blank. On the face of the strip A, which is of wood, metal, papier-mâché, etc., are glued teeth B, spaced according to the requisite pitch. The flexible strip A, is then placed upon the face of a wheel and secured on the rim by glue or other means to form a complete pattern. The teeth B are made by shaping a stick of wood to represent in cross-section a desired tooth,

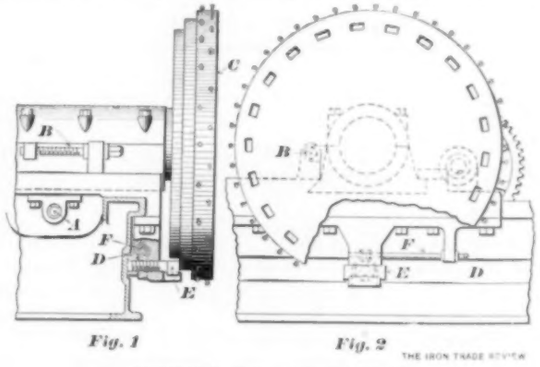


ANOTHER SCHEME FOR THE PATTERNMAKER.

and this stick is cut transversely to form gear-teeth having a length of face corresponding to the width of the desired gear. It is understood that as the strip A is made of a flexible material and since the bend under each tooth is so slight that it is practically a straight line the strip can be readily bent so as to lie smoothly on the peripheral surface of the wheel C, the ends of the strips abutting. It is understood that by the arrangement described patterns for spur-wheels, internal gear-wheels, bevel gear-wheels, and the like, can be readily formed in the manner above set forth and at a comparatively small expense."

Rotary Planer Improvement.

William J. Hagman, of Philadelphia, has an improvement in rotary planer construction which is here illustrated in detail and as applied to a large machine built by the Niles-Bement-Pond Co., of New York. The rotary planer, or slabber as it is sometimes termed, is defined by the patent specifications and the advisability of the invention outlined as follows: "The so-called 'rotary planer' involves a large rotating disk cutter arranged to act on work having a relative motion of advance past the cutter in a path at right angles to the axis of the cutter and having also relative motion of feeding or adjustment in a path parallel with the axis of the cutter. Such machines are really large milling machines; but the trade has



SUPPORTING THE CUTTER WHEEL.

appropriated to them the term 'rotary planers' without, so far as I know, having defined or being able to define the exact distinction between the two classes of machines. In the rotary planing machine as generally constructed a saddle feeds longitudinally upon a bed, and the headstock carrying the cutter adjusts in the saddle transversely of the bed. The cutter

wheels are large, often several feet in diameter, and the work done by them is of heavy character and the axial strains upon the cutter are consequently great. These strains acting on the face of the cutter wheel, tend to buckle the wheel or throw it into a plane not at right angles to the axis of the spindle, and it has been sought to remedy this defect by providing the headstocks or saddle with adjustable thrust shoes engaging the rear of the cutter wheel. Such thrust shoes become efficient only as regards strains applied at points pretty well up on the face of the wheel. In these machines much of the heaviest work is done at the lower portion of the wheel below the level of the saddle; and it is the purpose of my present improvement to provide a thrust device at the lower portion of the cutter wheel at a point below the saddle and to impose the strain of the thrust at this point directly upon the bed."

Fig. 1 is an elevation of a rotary planer, the bed appearing in transverse section and a part of the thrust bracket in vertical section. Fig. 2 is a view at right angles to Fig. 1 and shows a portion of the cutter wheel broken away. The feed screw A moves the saddle along the bed, B is the screw for adjusting the headstock in the saddle and C is the cutter wheel. There is a guide surface at D extending along the face of the bed at a level corresponding with the lower portion of the cutter wheel. A thrust bracket slides on the bed with the saddle and has a bearing against the surface D. This thrust bracket is mounted on a part of the saddle overhanging the front of the bed. A thrust shoe E engages a bearing surface on the rear of the cutter wheel and there is a worm wheel pocketed in the thrust bracket and threaded on the stem of the shoe E for adjusting the latter against the cutter wheel. At F is a shaft for rotating the worm. A horn projects forward from the thrust bracket under the shoe and lugs on the latter, having a sliding fit on the slides of the horn and prevent the dragging of the shoe sidewise in contact with the cutter wheel. The shoe is given a fair bearing on the rear of the cutter wheel after the latter has been adjusted to the desired depth of cut. Then the rearward strain at the lower part of the cutter wheel is imposed on the shoe and transmitted through the stem and worm wheel to the thrust bracket and thence to the machine bed. Fig. 3 illustrates the device on a massive machine tool. The inventor is with the Philadelphia plant of the Niles-Bement-Pond Co.

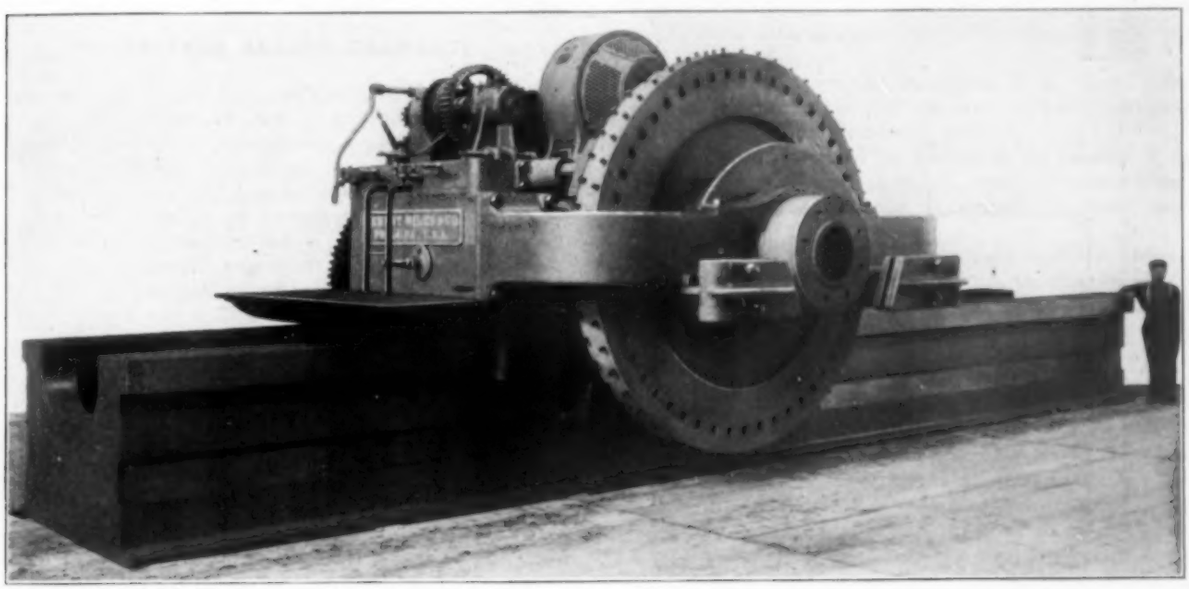


FIG. 3.—ROTARY PLANER WITH SUPPORTING SHOES TO CUTTER WHEEL.

Bolt Manufacturing.

Jacob L. Replogle, of Westmont, Pa., has patented a system of bolt which is claimed to develop the full strength of the stock in a bolt with a rolled thread. He says that the threaded end, although of lesser diameter at the root of the thread than the body of the bolt, can be made of equal or greater strength. "I have discovered that this is due to the fact that the threaded end has a greater radiating surface, due to the threaded corrugations thereof, and thereby cools more rapidly than the body of the bolt. This rapid cooling, together with the extra work done on the material in forming the roll-threaded end, strengthens said threaded end to such an extent that although of smaller diameter at the root of the thread it is equal to or greater than the strength of the body thereof. In this connection it should be noted that the radiating surface of the threaded end of a bolt is about twice as great as that of the body for equal lengths thereof. My method in general consists in subjecting a bolt heated to a temperature which will be hereinafter described to the cooling effect of a quenching liquid, such as water or other suitable medium, and then removing the same while it is still hot within and allowing it to cool by contact with the atmosphere and the interior heat to diffuse by conduction, and this process is particularly applicable to steel bolts."

The process may be abridged from the patent papers as follows: The round rod or blank when drawn from a heating furnace preparatory to being placed in a bolt threading machine is at a temperature corresponding to a bright orange. After the head has been formed and the thread shaped by rolling, the threaded end owing to its larger surface and contract with the dies is red and the remainder of the bolt is orange color. The bolt is then dipped into water or other cooling medium and allowed to remain there for a few seconds, the time depending upon the size of the bolt, its temperature, the character of the steel, and the temperature of the cooling medium, etc. The bolt is withdrawn from the water, the head is red as on account of its greater bulk it is not so thoroughly cooled as the other portions, the body is dark red, while the threaded end is black owing to the large amount of surface exposed to the cooling medium. A short time after the bolt has been withdrawn from the water and the interior heat has had a chance to diffuse towards the surface, the body portion and the threaded end are respectively a dull and a dark red.

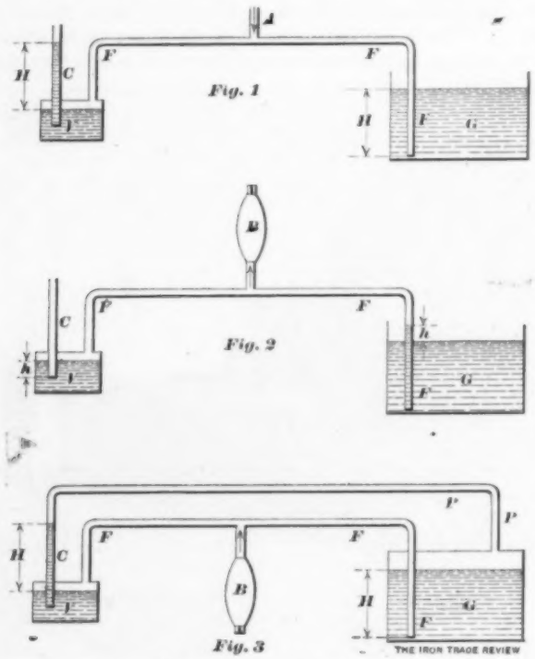
"The effect of the treatment described is to increase the elastic limit and ultimate strength of the threaded end over that of the body, owing to the more sudden and thorough cooling thereof, accomplished by immersion in a cooling liquid,

due to the greater extent of radiating and conducting surface of said threaded end as compared with that of the body of the bolt, and this is a particular and important feature of my invention." The inventor says that he is aware that it is not new to treat steel axles and other forgings in a similar manner, but claims screw threaded bolts are peculiar in shape and surface and capable of receiving different qualities in their several parts by his method.

A Depth Indicator for Tanks.

The *Mechanical Engineer* has had some description of the Murphy gauge for measuring the depth of fluids in tanks. An error crept into the first description and our contemporary has given an amended account which is here appended. The instrument has been put in practical form by Schaeffer & Budenberg, Ltd., of Manchester:

The device permits of the depth of fluid in a tank situated at a distance to be instantaneously recorded in any convenient position, such as a manager's office, no matter whether it be above or below the level of the tank, and no matter whether the tank be open or closed, under pressure or open to the



THE APPLICATION OF THE DEPTH GAUGE.

atmosphere. The diagrams, Figs. 1-3, will help to make the operation of the device under various conditions clear.

Referring to Fig. 1, G is a tank containing liquid to a depth H. If a pipe F dipping to the bottom of this be connected to a closed vessel V, containing say, for simplicity, a similar fluid and having a glass tube C dipping into it. Then if pressure be forced into the pipe F at A it will cause a column of fluid H to rise in the tube C equal to the depth in the tank. Any attempt to increase the air pressure beyond this would simply result in the escape of bubbles from the end of the pipe F at the bottom of the tank G. The reading of the column C would obviously be unaffected whatever was its relation to the tank G in respect to level or distance.

So much as regards the main principle of the device. The action of the bellows B (Fig. 2) is equally interesting. The bellows is merely a closed flexible casing, with a capacity of compression or expansion about equal to the volume of fluid in the dip pipe in the tank G. To understand its operation, imagine the air in the pipe F to be in its normal state, viz., at atmospheric pressure. The first effect of an aspiration is to cause a partial vacuum, which lifts the fluid in the dip pipe F in the tank G to a height *h* equal to the depth to which the gauge glass C dips into the tank V, further aspiration causing air to be drawn into the tank V, where it is imprisoned the moment compression begins in consequence of the sealing action of the fluid in the closed tank V. If compression be continued, its effect then is to depress the fluid in the dip pipe in the tank G, and raise a corresponding column in the glass tube C, until it equals the depth of fluid in G just as in Fig. 1, beyond which compression cannot be carried, as the air then escapes from the pipe F in the tank G. It will be seen there is an entire absence of valves in the apparatus, and thus there is nothing to get out of order, however long the apparatus may be standing idle.

The diagram Fig. 3 shows how the apparatus operates when the tank G is enclosed or working under pressure. All that is necessary is to connect the top of the gauge column C with the tank by means of a pipe P, so that the pressure is common to both. The working of the apparatus in other respects is precisely the same as before.

For convenience of explanation, we have assumed the fluid in the tank V to be the same as that in the tank G, but any other fluid, such as mercury, may be used if it is more convenient, as it may be in some cases where the depth of the fluid in the tank G is considerable. All that is necessary is a suitable modification of the scale attached to the gauge glass C.

STANDARD ROLLER BEARING CO.

S. S Eveland, vice-president and general manager of the Standard Roller Bearing Co. has just purchased for that company all the machinery, merchandise, assets and good will of the steel ball business of the Federal Manufacturing Co., of Cleveland. The deal was for cash and involved the transfer of merchandise, tools, machines, etc., valued at $250,000. The Federal Manufacturing Co. has manufactured steel balls for 15 or 20 years and had the largest factory for that purpose in the world. The Standard Roller Bearing Co. about a year ago bought and transferred to Philadelphia the ball business and machinery of the Grant Ball Co., of Cleveland, and of Franklin, Pa., and has been turning out from 4,000,000 to 5,000,000 balls a week. The Federal company's plant will also be moved to Philadelphia, which will give the Standard Roller Bearing Co. a capacity of over 500 million balls per year. The property of the Federal company secured by the purchase consist of about three hundred machine tools of various descriptions, 5,000 small tools and over 100,000,000 steel, brass and bronze balls of all sizes, such as are used in bicycles, ball bearings, roller bearings, etc.

The Standard Roller Bearing Co. in the past year has built and equipped a large addition to its factory in Philadelphia at a cost of $300,000. The main factory consists of a building 500 ft. long by 150 ft. wide and another of three stories 70 ft. by 260 ft. There is also a large foundry, forging and blacksmith shop, hardening room, etc., giving a total floor space of over 100,000 sq. ft. An additional piece of ground has recently been purchased measuring 300 ft. by 200 ft. adjoining their factory, upon which another addition will at once be erected to accommodate the machinery purchased from the Federal Mfg. Co. The ball making is directly under the charge of Robert H. Grant, superintendent, who was formerly manager of the Grant Ball Co. with which he had 18 years experience in the manufacturing of steel balls. Thomas J. Heller, who represented the Federal Mfg. Co. for a number of years in New York, having entire charge of the Eastern business, will continue as manager of the ball sales department. F. M. Germane, who for a number of years had charge of the Western territory for the Federal Mfg. Co., will be Western sales manager for the Standard Co., with headquarters in Chicago, where he will carry a full line of steel balls, roller and ball bearings, etc. At present he will run the Federal ball plant for the Standard Roller Bearing Co. until it is moved to Philadelphia in June.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers :—

Proposals for hardware, iron, nails, plumbers, steam and gas fitter's tools, fittings and supplies will be received by the Commissioner of Indian Affairs, 602 South Seventh street, St. Louis, Mo., until April 27. Particulars may be obtained by addressing F. E. Leupp, Commissioner of Indian Affairs, Washington, D. C.

The Richard Eccles Co., Auburn, N. Y., has been incorporated with a capital of $100,000 for the manufacture of iron and steel forgings. Directors are: Richard Eccles, William W. Eccles and Andrew H. Johnson.

The United Foundry Co., Cincinnati, O., has been incorporated with a capital of $25,000. Incorporators are: J. W. Malloy. H. W. Mueller, Frank Grieme, George Laible and Christian Hasecoster.

The Thomas Spring & Gear Co., Canisteo, N. Y., has been incorporated with a capital of $20,000. Directors are: Charles Thomas, C. O. Rose, A. O. Hopkins, Hornellsville.

The Davis Foundry & Machine Tool Works, Rome, Ga., is in the market for a 10-ton traveling crane.

The Alabama Consolidated Coal & Iron Co., Gadsden, Ala., is in the market for boilers, blowers, steam fittings, etc., for its new 200-ton blast furnace.

The Eastern Pennsylvania Stone Co. is incorporating to deal in trap rock, and will be in the market for rock crushers, rollers, screens, conveyors, etc. Address I. G. Ross, 1208 Pennsylvania building, Philadelphia, Pa.

The Strobel Steel Construction Co., Chicago, has been incorporated with a capital of $50,000. Incorporators are: Charles L. Strobel, Henry A. Gardner and William France Anderson.

The Board of Ways of Communication of Argentina will shortly call for bids for the construction of bridges over the arroyos San Carloss, Barrancon and Aguanda and the reconstruction of a bridge over the arroyo Clara. The estimated cost is $112,000. Separate tenders will be asked for the material and for construction. Bids will also be asked for repairs to the Custom House building at Concepcion del Uruguay; estimated cost, $16,000.

The Isaac Kubie Co., 96 Maiden lane, New York, is soliciting estimates for about 550 tons rails, freight cars for carrying sugar cane, locomotive and other equipment for about eight miles of standard gauge railroad to connect two important sugar estates with one of the principal railroads in Cuba.

Fires and Accidents :—

An explosion in the power plant of Eckel Bros., Syracuse, N. Y., March 23, caused a loss of $10,000. The Corliss engine was wrecked.

The fire March 27 in the Star Iron Works, Montreal, caused a loss of $60,000.

The plant of the Carter & Hakes Co., Winsted, Conn., maker of milling machinery, was partly burned March 29. The loss is $14,000, covered by insurance. Many valuable patterns and a number of finished machines were destroyed.

The plant of the Walker Mfg. Co., Council Bluffs, Ia., was destroyed by fire March 25. Loss $40,000.

New Construction :—

The Tuscaloosa Foundry & Machine Co., Tuscaloosa, Ala., has completed its new foundry, 50 x 70 ft., and will build a machine shop, 30 x 80 ft. The company will do a general foundry and machine business.

The Hart-Parr Co., Charles City, Ia., will build an addition to its main building, 85 x 185 ft., and will extend the foundry by an addition 60 x 75 ft. The capacity of the plant will be nearly doubled.

The J. Geo. Leyner Engineering Works, Denver, Col., contemplate building an addition to their plant. At the present time about 200 men are employed, and it is expected that within a month the force will be doubled.

The B. F. Barnes Co., Rockford, Ill., will build a two-story machine shop, 100 x 80 ft., this summer.

The Hay Foundry & Iron Works, Newark, N. J., is about to build a new structural shop, 130 x 400 ft., a template shop, 50 x 80 ft., power house, 50 x 80 ft., and other additions. Prices are wanted on machinery, cranes, etc.

The American Pulley Co., 29th and Bristol streets, Philadelphia, Pa., will build an addition to its plant, 50 x 150 ft., one story.

The Standard Sanitary Mfg. Co., Louisville, Ky., has awarded the general contract for an iron foundry and warehouse to the Milwaukee Bridge & Iron Co. The cost will be $50,000.

The Crescent Mfg. Co., Greenfield, O., will erect a plant at Louisville, Ky., for the manufacture of wood and iron novelties. The cost will be $25,000.

The Stocker Machine Co. will build a plant, 48 x 151 ft., at 20 Clinton street, Chicago.

An addition to the J. E. Tilt building, Huron and Kingsbury streets, Chicago, has been built at an expense of $100,000, and has been leased by the Gibson Wire Spring Co. at an annual rental of $17,000.

The Payne & Beard Co., Lexington, N. C., recently incorporated, will erect a building, 75 x 40 ft., and will manufacture galvanized iron and sheet-metal work.

Fred C. Ayer has sold his interest in the Baschen & Ayer Machine Co., Chicago Heights, Ill., and will build a plant of his own, 44 x 60 ft, where he will manufacture metal specialties.

The American Steel Foundries advises us that it expects to enlarge the capacity of its plant at Sharon, Pa., by the erection of additional buildings, in order that it may have more space in its finishing department. The details have not yet been decided upon.

The Iron Clad Mfg. Co., Brooklyn, N. Y., whose plant was recently destroyed by fire, advises us that it will rebuild, but is not able to state where the new plant will be located. The company has been cramped for room for several years, as it had many factories under one roof. It had its range boiler factory, soda fountain factory, milk can factory, steel barrel factory, galvanized ware factory, enameled ware works and ice cream can factory all combined, in a way, and in replacing the building the company is anxious to have each one of these factories independent of the other.

General Industrial Notes :—

The orders on the books of the Pressed Steel Car Co. are said to be the largest in its history. It is expected that the earnings during the current year will be large enough to pay the regular dividend of 7 percent on the preferred stock, pay off at least $1,000,000 of the outstanding gold bonds and show a substantial surplus.

Benjamin Watson, 66 to 70 Beaver street, New York City, has recently incorporated his business. He will continue a brokerage business, representing railroads and other corporations for the buying and selling of equipment, railway supplies, machinery, etc. In the past he has represented a number of large roads, and at present has the sale of all the New York Elevated Railway locomotives and cars which have been retired on account of the road having been equipped with electricity.

The Walker Steel Range Co., Ltd., has removed from Windsor, Ont., to Grimsby, Ont. The company has been granted a loan of $15,000 by the city of Grimsby for a term of years, has purchased a large foundry property there, and

will increase facilities in every way so that it will be able to take care of the large business which it has booked.

A contract for 200 street cars of the largest and latest pattern, fully equipped, has been awarded the J. G. Brill Co. by the Chicago City Railway Co. The order is said to amount to about $1,500,000. Delivery is to be made before June 1, and in order to complete the work at the required time, the contract will be divided among the company's plants in Philadelphia, Elizabeth, N. J., Cleveland and St. Louis. The works at each place will build 50 of the cars.

The International Power Co. has received a contract to build for the Baldwin Locomotive Works, Philadelphia, two of the largest size Diesel engines.

The dry dock built by the Maryland Steel Co., Sparrows' Point, Md., for the United States Government, is now nearing completion, and plans for towing it to Subig Bay, in the Philippines, are now under consideration. The dock is 500 ft. long, 100 ft. wide and 42 ft. high, and is capable of lifting a ship drawing 35 ft. of water. The displacement of the dock is 11,000 tons and its cost $1,124,000. By using the new dock the United States navy will be independent of foreign docking facilities of Hong Kong and other Eastern ports.

The Abner Doble Co., of San Francisco, has filled the following foreign orders for water wheels recently: A 300-h. p. double Doble wheel, equipped with two Doble needle-regulating nozzles, for the Hilo Electric Light Co., of Hawaii; four 340-h. p. wheels for the Braden Copper Co., of Chili. An order recently received calls for a complete sawmill outfit to be installed in the Philippine Islands.

Norman B. Livermore & Co., San Francisco, has shipped to Honolulu a quantity of dredging machinery and equipment for the use of Lord & Belser, of that city, on a $200,000 dredging and filling contract for the Government.

The Freeman Foundry & Machine Co., Joplin, Mo., is extending its business into Mexico. Several car loads of machinery have recently been shipped to Torres, Sonora, Mex. A large number of mine cars have been shipped to Kansas, Indian Territory and Arkansas. Some new equipment is being added by the company.

The Muncie Gas Engine Supply Co., Muncie, Ind., is preparing to operate its plant both night and day. The number of employes will be increased by 50. The company has recently completed the building of a new structure.

The Oklahoma City Wire Work Mfg. Co., Oklahoma City, Okla., is enjoying a prosperous business. W. S. Hanson, formerly with the American Round Bale Cotton Co., has been engaged as superintendent to take charge of the mechanical department. Considerable new machinery will be installed to enlarge the company's manufacturing business.

The Evens & Howard Fire Brick Co., St. Louis, Mo., has secured the contract for the firebrick to be used in the construction of 60 new coke ovens for the Monterey Iron & Steel Works, Monterey, Mex.

The Honolulu Iron Works, Hawaiian Islands, which competed with foundries in the United States for the installation of sugar plants in Mexico and other Central and South American countries, has secured the contract to erect a 12-roller mill for the Hawaiian Sugar Co.

The third full cargo of iron piping for the Panama Canal was shipped from Mobile, Ala., this week. The lot consisted of 100 carloads of various sizes of piping from the Anniston, Ala., foundries of the United States Cast Iron Pipe & Foundry Co. Large quantities will also be shipped by way of New Orleans.

The Baldwin Locomotive Works, Philadelphia, are now building two electric locomotives for the Swedish Government for use on the state railways.

The Suburban Engineering & Contracting Co., 29 Broadway, New York recently incorporated with a capital of $100,000, will pursue a general engineering and contracting business, particularly with reference to water works, filtration systems, pipe lines, coal handling plants, power development, concrete dams and re-enforced concrete construction. The officers are: A. McD. Gray, president; Geo. L. Scheneck, secretary and treasurer; J. B. McCord, engineer and manager. They have had an extended experience in engineering and contracting work. Mr. Gray has been connected with the Tide Water Oil Co., Bayonne, N. J., and the Carteret Mfg. Co., Carteret, N. J. Mr. Schenck has for many years been engaged in the designing and construction of special machinery. Mr. McCord has until recently been connected with the New York Continental Jewell Filtration Co., New York and Chicago, as engineer on the design and construction of filtration systems, waterworks and general contracting work.

Directors of the Pennsylvania Railroad Co. have ordered an issue of $100,000,000 convertible bonds at $75 a share bearing 3½ percent interest. Privileges are extended to the stockholders. Of the bond issue $50,000,000 was authorized by a stock vote and the remaining $50,000,000 was authorized two years ago, but has never been issued. It is stated that the Pennsylvania Railroad Co. has already planned the expenditure of $100,000,000. About $25,000,000 will be provided to help the Pennsylvania company to take up notes due next fall and $28,000,000 will be expended to retire Pennsylvania Railroad Co. bonds maturing in June and July. The company will spend about $12,500,000 on the New York tunnel and terminal project, and improvements to the extent of another $12,500,000 are planned at different points along the lines of the company. The locomotive and car orders for the year will require an outlay of several million more dollars.

Under the reorganization plan of the Colorado Fuel & Iron Co., $17,000,000 new bonds and $3,400,000 new common stock were set aside for the redemption of the properties held by the Rockefeller and Gould interests, who advanced $12,991,200 cash to the Colorado Fuel & Iron Co. in the fall of 1903, with the understanding that the properties of the company turned over to them should revert again to that company upon the payment of the cost price, with expenses and reasonable interest. From the sale of $17,000,000 bonds and $3,400,000 common stock all but $834,460 will be required to redeem the properties. Through the reorganization plan, however, the company will have in the treasury, available for additional capital and future requirements, $8,000,000. There will also be in the treasury, reserved for retirement of the outstanding issue of $6,000,000 first mortgage bonds, an equal value in new bonds.

At the annual meeting of the stockholders of James Bonar & Co., Inc., of Pittsburg, held on March 27, the following officers were elected: James Bonar, president; Isaac W. Semans, vice president; Joseph Cawley, secretary; Richard J. Pollard, treasurer. The same gentlemen were also elected directors. The statement of business for the preceding year showed a large increase, and the company reports a good demand for the various steam appliances it manufactures. A new catalogue will be sent to engineers upon request.

The stockholders of the Columbus Forge & Iron Works, Columbus, O., have partly reorganized the company since the death of its president, William W. Franklin. Foster Copeland, who had been treasurer of the company, was made president and treasurer. F. A. Miller, of the Godman Shoe Co., was elected vice president, and David W. Singleton was re-elected secretary. Two new directors were elected in the persons of R. S. Warner and W. D. Brickell.

Fieser & Bentley, Columbus, O., dealers in pig iron, and operators under lease of three Ohio furnaces, announce that Louis F. Fieser has retired and that the business will be conducted by Linn Bentley & Co. The firm is one of the oldest in that city. The office of the new firm will be in the Wyandotte building.

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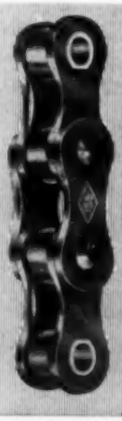

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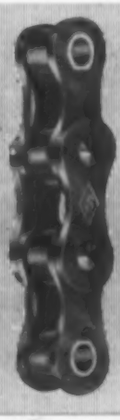

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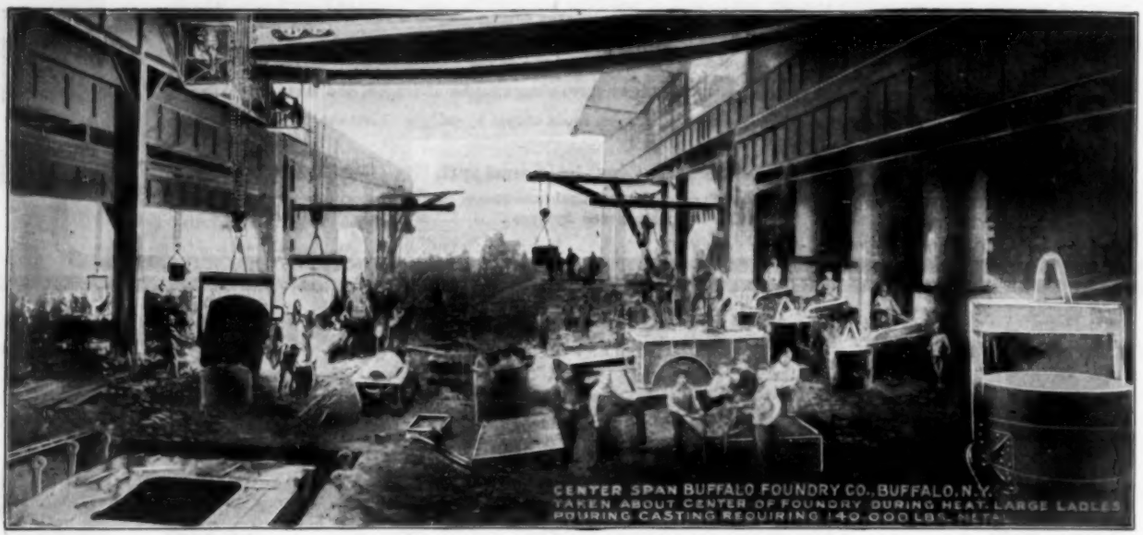
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